Urologic Diseases in America

Interim Compendium

RAND Health

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UROLOGIC DISEASES IN AMERICA

INTERIM COMPENDIUM

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This book is dedicated to the memory of Dr. Dalia Spektor, 1944–2002.

UROLOGIC DISEASES IN AMERICA

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Urinary Incontinence in Women

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SUMMARY

Urinary incontinence affects from 15% to 50% of community-dwelling women of all ages. It is one of the most prevalent chronic diseases, although it is often not recognized by the US health care system. The direct cost of urinary incontinence for women in the United States was $12.4 billion in 1995 dollars (1). Approximately one in ten women in the United States undergoes surgery for urinary incontinence or pelvic organ prolapse, and a sizable minority of women bear the cost of pads, medications, and nonsurgical therapies.

INTRODUCTION

Population-based studies estimate that a large proportion of adult women report the symptom of urinary incontinence. As many as three-fourths of US women report at least some urinary leakage and studies consistently find that 20 to 50% report more-frequent leakage. While some authors have interpreted this to mean that nearly half of American women "suffer" from incontinence, others point out that many women with occasional incontinence are not sufficiently bothered by it to seek care. Of greater clinical relevance is an improved understanding of the number of women with severe or more-frequent leakage, estimated fairly uniformly at 7% to 10% by various researchers. Currently, there is little understanding of the number of women whose lives are truly impacted by urinary incontinence or of its true burden on American women. Indeed, the demarcation between incontinence as a symptom and incontinence as a disease is far from clear. For example, 25% of female college varsity athletes lose urine when doing provocative exercise, and most do not consider it a problem; indeed, most experts would agree that these young women do not have a major health problem. Conversely, most experts would agree that middle-aged women who lose urine throughout the day, wear pads, curtail desired activities because of leakage, and truly suffer have a disease and would benefit from treatment.

Studies that inquire about the presence of "any" or "occasional" incontinence may overestimate the actual burden of incontinence on the health care system, but available data on incontinence treatment underestimate the actual burden, given that many women with bothersome leakage do not seek care. While readily available information about incontinence treatment in adult women in the United States indicates only the lowest possible burden urinary incontinence presents to the health care system, it does provide a foundation on which to base future studies and to project future care. This chapter uses data from various sources to begin defining not only the prevalence of incontinence, but also its impact on the US health care system. At this time, equally important information about the burden of disease on women who are not seeking treatment is not available. The impact of incontinence on the women themselves, their families, their work, and society is also not yet well defined in the literature.

Table 1. Codes used in the diagnosis and management of female urinary incontinence

Females 18 years or older, with one the following ICD-9 diagnosis codes, but not a coexisting 952.xx or 953.xx code:

596.51	Hypertonicity of bladder
596.52	Low bladder compliance
596.59	Other functional disorder of bladder
599.8	Other specified disorders of urethra and urinary tract
599.81	Urethral hypermobility
599.82	Intrinsic (urethral) sphincter deficiency (ISD)
599.83	Urethral instability
599.84	Other specified disorders of urethra
625.6	Stress incontinence, female
788.3	Urinary incontinence
788.30	Urinary incontinence unspecified
788.31	Urge incontinence
788.33	Mixed incontinence, male, female
788.34	Incontinence without sensory awareness
788.37	Continuous leakage

Fistulae

596.1	Intestinovesical fistula
596.2	Vesical fistula not elsewhere classified
619.1	Digestive-genital tract fistula, female
619.0	Urinary-genital tract fistula, female

Spinal cord injury-related incontinence

(When associated with other ICD-9 diagnosis codes for spinal cord injury 952.xx or 953.xx)

344.61	Cauda equina syndrome with neurogenic bladder
596.51	Hypertonicity of bladder (specified as overactive bladder in 2001; included if associated with diagnosis code 952.xx)
596.52	Low compliance bladder
596.54	Neurogenic bladder, NOS
596.55	Detrusor sphincter dyssynergia
596.59	Other functional disorder of bladder
599.8	Other specified disorders of urethra and urinary tract
599.84	Other specified disorders of urethra
625.6	Stress incontinence female
788.3	Urinary incontinence
788.30	Urinary incontinence, unspecified
788.31	Urge incontinence
788.32	Stress incontinence male
788.33	Mixed incontinence, male and female
788.34	Incontinence without sensory awareness
788.37	Continuous leakage
788.39	Other urinary incontinence

DEFINITION AND DIAGNOSIS

Urinary incontinence is defined by the International Continence Society as "the complaint of any involuntary leakage of urine" (2). This supplants the group's previous long-held definition, in which the diagnosis of incontinence required that the leakage be a social or hygienic problem. The less restrictive definition is likely to capture more individuals who experience incontinence, including the many women who may leak daily but do not describe leakage as a social or hygienic problem. A diagnosis of urinary incontinence can be based on the patient's symptoms, the sign of incontinence noted during physical examination, or diagnostic urodynamic testing. Table 1 lists ICD-9 codes commonly used to identify urinary incontinence.

The International Continence Society further categorizes types of incontinence, as well as other bladder symptoms. *Stress urinary incontinence* is the complaint of involuntary leakage on effort or exertion or on sneezing or coughing. Stress urinary incontinence also describes the sign, or observation, of leakage from the urethra synchronous with coughing or exertion. When stress incontinence is confirmed during urodynamic testing by identifying leakage from the urethra coincident with increased abdominal pressure (for example, during a cough or sneeze) but in the absence of a bladder contraction, the diagnosis of *urodynamic stress incontinence* is made.

Urge urinary incontinence is the complaint of involuntary leakage accompanied by or immediately preceded by an urge to urinate and may be further defined with urodynamic investigation. Conventional urodynamic studies take place in a laboratory and involve filling the bladder with a liquid, then assessing bladder function during filling and emptying. If during urodynamic testing the patient demonstrates either spontaneous or provoked involuntary detrusor contractions while filling, she is said to have *detrusor overactivity*. If a relevant neurologic condition exists, the detrusor overactivity is further categorized as *neurogenic*; when no such condition is identified, the overactivity is termed *idiopathic*. These terms replace the previously used *detrusor hyperre exia* and *detrusor instability*. Many women with urge incontinence do not manifest detrusor overactivity on urodynamic testing. This may be due in part to the fact that such testing, which lasts approximately an hour, is merely a snapshot of the patient's overall bladder function. Ambulatory urodynamic studies can also be performed to document the patient's leakage during everyday activities; such studies identify more detrusor contractions during filling than do conventional ones. Nonetheless, treatment for urge incontinence is often based on implicit clinical assessment because of the low predictive value of a negative test.

Other diagnostic tests may be used to help characterize incontinence and its severity. A pad test quantifies the volume of urine lost by weighing a perineal pad before and after some type of leakage provocation. This type of test has also been used in attempts to distinguish continent from incontinent women. Pad tests can be divided into short-term tests, usually performed under standardized office conditions, and long-term tests, usually performed at home for 24 to 48 hours. Short-term pad tests are generally performed with a symptomatically full bladder or with a certain volume of saline instilled into the bladder before the patient begins a series of exercises.

A voiding diary, or bladder chart, is a record maintained by the patient of her urinary frequency and leakage, voided volumes, and fluid intake over a 3- to 7-day period. This noninvasive test provides useful information about bladder capacity, type of incontinence symptoms, diurnal versus nocturnal voiding patterns, and appropriateness of fluid intake.

INCIDENCE AND PREVALENCE

As noted above, a wide range in the prevalence of urinary incontinence has been reported. One compilation of such studies (3) indicates that approximately 50% of adults report "any" incontinence, while 5% to 25% note leakage at least weekly, and 5 to 15% note it daily or most of the time (Table 2). Rates of incontinence severity patterns are depicted in Figure 1. The rate of urge incontinence tends to rise with age, while the rate of stress incontinence decreases somewhat in the oldest age groups, possibly due to lower activity levels (Figure 2). In a large population of Norwegian women, the rate of stress incontinence peaked at approximately 60% in women 40 to 49 years of age; urge incontinence

Table 2. Prevalence of urinary incontinence by frequency and gender in older adults, proportion (counts)

Study	Age	Frequency	Prevalence				F/M Ratio
			Women		Men		
Thomas, 1980	65 +	"ever"	25.80%	(403/1562)	15.30%	(169/1102)	1.7
Rekers, 1992	65–79	"ever"	19.70%	(50/254)			
Hellstrom, 1990	85 +	"ever"	34.70%	(191/551)	18.40%	(49/266)	1.9
Milsom, 1993	66 +	"ever"	22.70%	(962/4238)			
Brockelhurst, 1993	60 +	"ever"	16.80%	(141/840)	12.80%	(90/701)	1.3
Lara, 1994	50 +	"ever"	50.70%	(71/140)			
Sommer, 1990	60–79	"ever"	44.90%	(62/138)			
Sandvik, 1993 & Saim, 1995	60 +	"ever"	31.5%*	(NR)			
Wetle, 1995	65 +	"ever difficulty"	44.40%	(1045/2360)	34.10%	(494/1449)	1.3
Nygaard, 1996	65 +	"ever difficulty"	55.10%	(1116/2025)			
Diokno, 1986	60+	1+ / 12 months	37.70%	(434/1150)	18.90%	(152/805)	2.0
Yarnell, 1979	65 +	1+ / 12 months	16.90%	(37/219)	10.70%	(18/169)	1.6
Yarnell, 1981	65 +	1+ / 12 months	49.60%	(89/180)			
Holst, 1988	65 +	1+/12 months	36.50%	(66/181)			
Milne, 1972 & Milne, 1971	62 +	"current"	41.50%	(114/272)	25.10%	(54/215)	1.7
Campbell, 1985	80 +	"current"	22.10%	(64/290)	21.60%	(29/134)	1.0
Hunter, 1996	50 +	"current"			6.00%	(120/2002)	
Nakanishi, 1997	65 +	"occasionally or more often"	9.70%	(82/842)	9.80%	(55/563)	1.0
Brockelhurst, 1993	60 +	1+ / 2 months	10.20%	(86/840)	5.30%	(37/701)	1.9
Diokno, 1986	60 +	1+ / month	21.70%	(250/1150)	10.40%	(84/805)	2.0
Brown, 1996	65 +	1+ / month	41.30%	(3285/7949)			
Thomas, 1980	65 +	2+ / month	11.40%	(178/1562)	6.90%	(76/1102)	1.7
Brockelhurst, 1993	60 +	2+ / month	10.20%	(86/840)	5.30%	(37/701)	1.9
Holst, 1988	65 +	2+ / month	21.50%	(39/181)			
Diokno, 1986	60 +	1+ / week	12.60%	(145/1150)	5.50%	(44/805)	2.4
Brockelhurst, 1993	60 +	1+ / week	8.30%	(70/840)	3.70%	(26/701)	2.2
Hellstrom, 1990	85 +	1+ / week	27.00%	(149/551)	15.00%	(40/266)	1.8
Rekers, 1992	65–79	1+ / week	6.30%	(16/254)			
Kok, 1992	60 +	2+ / week	22.90%	(164/715)			
Campbell, 1986	80 +	3+ / week	5.10%	(15/290)	3.70%	(5/134)	1.4
Wetle, 1995	65 +	"most or all of the time"	8.80%	(208/2360)	5.80%	(84/1449)	1.5
Sommer, 1990	60–79	"often or always"	8.70%	(12/138)			
Nygaard, 1996	65 +	"most or all of the time	8.30%	(168/2025)			
Diokno, 1986	60 +	1+ / day	5.20%	(60/1150)	1.70%	(14/805)	3.1
Hellstrom, 1990	85 +	1+ / day	16.70%	(92/551)	10.50%	(28/266)	1.5
Kok, 1992	60 +	1+ / day	14.00%	(NR)			
Brown, 1996	65 +	1+ / day	14.20%	(1130/7949)			
Nakanishi, 1997	65 +	1+ / day	2.50%	(21/842)	2.10%	(12/563)	1.2

NR, not reported; F, female; M, male.

*Mean of prevalence by 10-year age groups.

SOURCE nition, population char American Geriatrics Society.

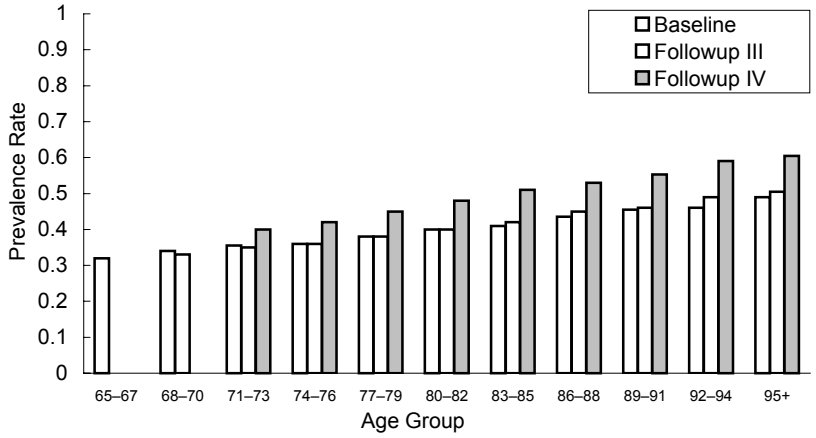

Figure 1. Estimated urge incontinence prevalence rates by age and interview. Follow-ups III and IV include responses 3 and 6 years after baseline, respectively.

SOURCE: Adapted from Nygaard IE, Lemke JH, Urinary incontinence in rural older women: prevalence, incidence, and remission, Journal of American Geriatrics Society, 44, 1049–1054, Copyright 1996, with permission from the American Geriatrics Society.

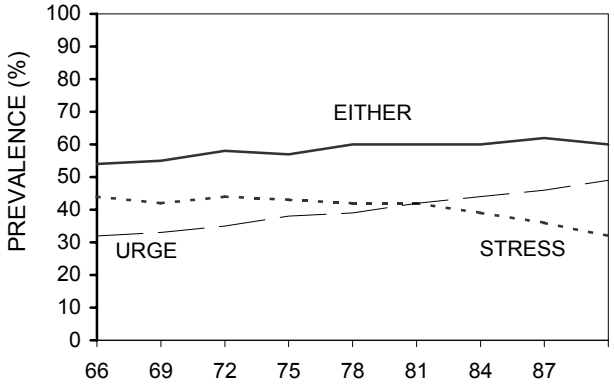

Figure 2. Prevalence of incontinence by age groups at baseline. Each age represents the midpoint of a 3-year age range. Because of the small number of women above age 90, the graph ends with age range 86-88. "Urge" and "stress" refer to women who answered affirmatively to the urge and stress incontinence questions, respectively. "Either" refers to women who reported any incontinence (either urge or stress).

SOURCE: Adapted from Nygaard IE, Lemke JH, Urinary incontinence in rural older women: prevalence, incidence, and remission, Journal of American Geriatrics Society, 44, 1049–1054, Copyright 1996, with permission from the American Geriatrics Society.

Table 3. Prevalence of difficulty controlling bladder among adult women

		Difficulty Controlling Bladder		
	Total	Yes	No	Refused to Answer or Don't Know
All	23,477,726	8,929,543 (38%)	14,449,905 (62%)	98,278 (0%)
Age at screening				
60–64	5,699,785	2,168,863 (38%)	3,530,922 (62%)	0 (0%)
65–69	4,895,878	1,785,380 (36%)	3,110,498 (64%)	0 (0%)
70–74	4,505,164	1,683,804 (37%)	2,818,651 (63%)	2,709 (0%)
75–79	3,453,472	1,515,900 (44%)	1,873,616 (54%)	63,956 (2%)
80–84	2,981,558	989,003 (33%)	1,967,390 (66%)	25,165 (1%)
85+	1,941,869	786,593 (41%)	1,148,828 (59%)	6,448 (0%)
Race/ethnicity				
Non-Hispanic white	18,729,539	7,662,444 (41%)	11,041,930 (59%)	25,165 (0%)
Non-Hispanic black	1,941,269	386,480 (20%)	1,554,789 (80%)	0 (0%)
Mexican American	649,003	230,567 (36%)	409,279 (63%)	9,157 (1%)
Other Hispanic	1,576,419	468,823 (30%)	1,107,596 (70%)	0 (0%)
Other race	581,496	181,229 (31%)	336,311 (58%)	63,956 (11%)
Education				
Less than high school	8,374,762	2,692,649 (32%)	5,682,113 (68%)	0 (0%)
High school	7,692,149	3,484,970 (45%)	4,207,179 (55%)	0 (0%)
High school+	7,212,158	2,725,611 (38%)	4,461,382 (62%)	25,165 (0%)
Refused	103,678	26,313 (25%)	13,409 (13%)	63,956 (62%)
Don't know	87,647	0 (0%)	85,822 (98%)	1,825 (2%)
Missing	7,332	0 (0%)	0 (0%)	7,332 (100%)
Poverty income ratio[a]				
PIR=0	111,440	31,876 (29%)	79,564 (71%)	0 (0%)
PIR<1	3,145,548	1,116,508 (35%)	2,026,331 (64%)	2,709 (0%)
1.00<=PIR<=1.84	5,520,548	2,193,641 (40%)	3,326,907 (60%)	0 (0%)
PIR>1.84	9,649,331	3,538,606 (37%)	6,085,560 (63%)	25,165 (0%)
Refused	2,090,410	759,112 (36%)	1,331,298 (64%)	0 (0%)
Don't know	1,560,474	741,618 (48%)	817,031 (52%)	1,825 (0%)
Missing	1,399,975	548,182 (39%)	783,214 (56%)	68,579 (5%)

[a]See glossary for definition of poverty income ratio.

The data in this table are based on question KIQ.040: " In the past 12 months, have you had difficulty controlling your bladder, including leaking small amounts of urine when you cough or sneeze?" (Do not include bladder control difficulties during pregnancy or recovery from childbirth.)

SOURCE: National Health and Nutrition Examination Survey, 1999–2000.

Table 4. Frequency of bladder control problems among those who responded "yes" to difficulty controlling bladder

		Frequency of Bladder Control Problems				
	All	**Every Day**	**Few per Week**	**Few per Month**	**Few per Year**	**Don't Know**
All	8,929,543	3,255,587 (36%)	2,408,421 (27%)	2,016,715 (23%)	1,082,624 (12%)	166,196 (2%)
Age at screening						
60–64	2,168,863	686,213 (32%)	429,351 (20%)	563,017 (26%)	490,282 (23%)	0 (0%)
65–69	1,785,380	475,030 (27%)	511,356 (29%)	479,229 (27%)	172,781 (10%)	146,984 (8%)
70–79	1,683,804	663,681 (39%)	536,511 (32%)	338,233 (20%)	145,379 (9%)	0 (0%)
75–79	1,515,900	575,823 (38%)	448,955 (30%)	286,739 (19%)	204,383 (13%)	0 (0%)
80–84	989,003	456,355 (46%)	233,503 (24%)	258,379 (26%)	21,554 (2%)	19,212 (2%)
85+	786,593	398,485 (51%)	248,745 (32%)	91,118 (12%)	48,245 (6%)	0 (0%)
Race/ethnicity						
Non-Hispanic white	7,662,444	2,759,807 (36%)	1,914,582 (25%)	1,909,818 (25%)	912,041 (12%)	166,196 (2%)
Non-Hispanic black	386,480	212,544 (55%)	74,408 (19%)	45,752 (12%)	53,776 (14%)	0 (0%)
Mexican American	230,567	89,173 (39%)	73,734 (32%)	26,952 (12%)	40,708 (18%)	0 (0%)
Other Hispanic	468,823	77,927 (17%)	315,040 (67%)	7,880 (2%)	67,976 (14%)	0 (0%)
Other Race	181,229	116,136 (64%)	30,657 (17%)	26,313 (15%)	8,123 (4%)	0 (0%)
Education						
Less than high school	2,692,649	1,381,281 (51%)	566,047 (21%)	463,584 (17%)	281,737 (10%)	0 (0%)
High school	3,484,970	1,104,097 (32%)	730,106 (21%)	1,040,720 (30%)	510,224 (15%)	99,823 (3%)
High school+	2,725,611	770,209 (28%)	1,112,268 (41%)	486,098 (18%)	290,663 (11%)	66,373 (2%)
Refused	26,313	0 (0%)	0 (0%)	26,313 (100%)	0 (0%)	0 (0%)
Poverty income ratio[a]						
PIR=0	31,876	0 (0%)	0 (0%)	31,876 (100%)	0 (0%)	0 (0%)
PIR<1	1,116,508	541,675 (49%)	182,029 (16%)	241,012 (22%)	151,792 (14%)	0 (0%)
1.00<=PIR<=1.84	2,193,641	810,902 (37%)	668,567 (30%)	394,473 (18%)	265,876 (12%)	53,823 (2%)
PIR>1.84	3,538,606	988,094 (28%)	1,110,863 (31%)	952,372 (27%)	374,904 (11%)	112,373 (3%)
Refused	759,112	274,391 (36%)	150,098 (20%)	143,238 (19%)	191,385 (25%)	0 (0%)
Don't know	741,618	325,985 (44%)	140,318 (19%)	186,751 (25%)	88,564 (12%)	0 (0%)
Missing	548,182	314,540 (57%)	156,546 (29%)	66,993 (12%)	10,103 (2%)	0 (0%)

[a]See glossary for definition of poverty income ratio.

The data in this table are based □
week, a few times a month, or a few times a year?"

SOURCE: National Health and Nutrition Examination Survey, 1999–2000.

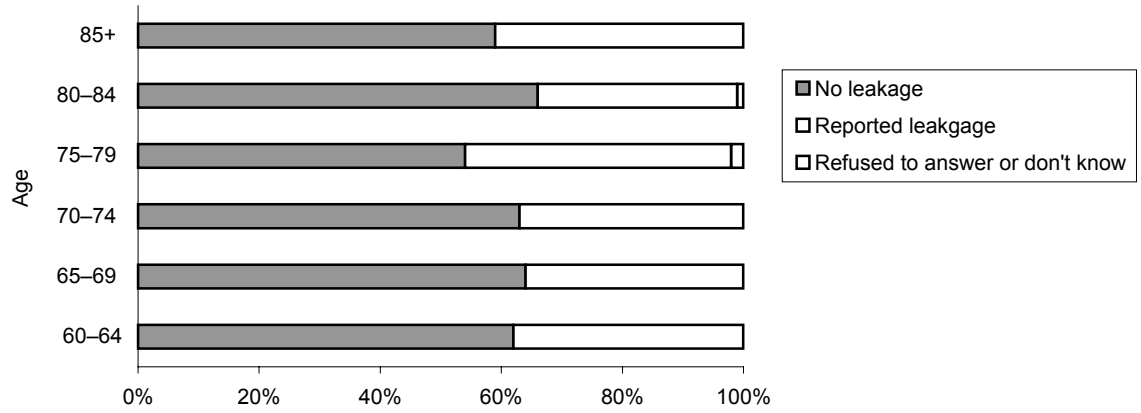

Figure 3a. Difficulty controlling bladder among female responders.

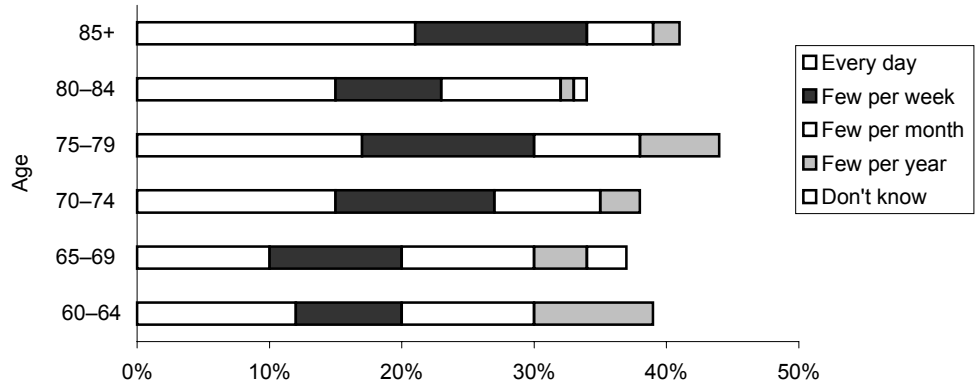

Figure 3b. Frequency of bladder control problems among female responders who answered "yes" to difficulty controlling bladder.

SOURCE: National Health and Nutrition Examination Survey, 1999–2001.

began to rise in women 50 to 59 years of age and peaked at roughly 20% in women between 80 and 89 years of age (4). Reasons for the divergence of estimates include variations in definitions, sampling methodologies, response rates, and question formats (5).

Consistent with the Norwegian study, the National Health and Nutrition Examination Survey (NHANES) asked a national sample of community-dwelling adults, "In the past 12 months, have you had difficulty controlling your bladder, including leaking small amounts of urine when you cough or sneeze (exclusive of pregnancy or recovery from childbirth)?" NHANES found the overall prevalence of urinary incontinence in women, as defined in this question, to be 38% in 1999–2000 (Table 3). When broken down by frequency of episodes, 13.7% of all women in NHANES reported daily incontinence, and an additional 10.3% reported weekly incontinence (Table 4). Prevalence was higher in non-Hispanic whites (41%) than in non-Hispanic blacks (20%) or Mexican Americans (36%). The prevalence of daily incontinence increased with age, ranging from 12.2% in all women 60 to 64 years of age to 20.9% in those 85 years of age and over (Figure 3). Women with less than a high school education reported incontinence

Table 5. Racial differences in urodynamic diagnoses and measures

	African American (n = 183)	Caucasian (n = 132)	P value
Diagnosis			
GSI (%)	41 (22)	60 (46)	0.001
Detrusor instability (%)	54 (30)	17 (13)	0.001
Mixed incontinence (%)	29 (16)	14 (11)	0.244
Other (%)	59 (32)	41 (31)	0.902
Measures (mean ± SE)			
Full volume (mL)	279 ± 11	326 ± 14	0.009
MCC (mL)	458 ± 14	536 ± 17	0.001
MUCP (cm H_2O)	68 ± 3	55 ± 3	0.001
MUCP <20 cm H_2O (%)	15 (8)	30 (23)	0.001

GSI, genuine stress incontinence; full volume, volume noted at fullness during filling cystometry; MCC, maximum cystometric capacity; MUCP, maximum urethral closure pressure. Racial comparison of diagnoses by chi^2 or Fisher exact test.

Racial comparison of measures by student t test.

SOURCE: Reprinted from American Journal of Obstetrics and Gynecology, 185, Graham CA, Mallet VT, Race as a predictor of urinary incontinence and pelvic organ prolapse, 116–120, Copyright 2001, with permission from Elsevier.

less often than did those with at least a high school education.

Other large population-based studies have also reported higher rates of urinary incontinence among non-Hispanic whites than in other ethnic or racial groups. In a large cohort of 50- to 69- year-old women enrolled in the Health and Retirement Survey, non-Hispanic blacks and Hispanics were both 60% less likely to have severe incontinence than were non-Hispanic whites, after adjusting for various comorbidities (6). Similarly, baseline data from the Heart and Estrogen/Progestin Replacement Study showed that non-Hispanic whites were 2.8 times more likely to have weekly stress incontinence than were non-Hispanic blacks, after adjusting for relevant factors (7). This epidemiologic trend appears consistent with laboratory findings as well. Graham and colleagues noted that among women presenting for incontinence treatment, stress incontinence was diagnosed more frequently in Caucasian women, and detrusor overactivity was seen more often in African American women (8). These diagnoses were also consistent with the study's finding that Caucasian women had lower urethral closure pressures than did African American women, while African American women had a lower bladder capacity than Caucasian women (Table 5). A recent analysis of data from the Study of Women's Health Across the Nation (SWAN), which included 3,302 women 42 to 52 years of age provided a closer look at nuances related to race/ethnicity and urinary incontinence (9). African American women with leiomyomata had a 1.81-fold higher risk of urinary incontinence than did Caucasian women, while African American women without fibroids had a decreased risk of urinary incontinence (OR 0.31). Hispanic and Japanese women had a lower risk than did Caucasian women (OR 0.44 and 0.58, respectively). In Chinese women, the risk of incontinence was modified by educational status; the OR of those with less than a college education was 0.35 relative to that of Caucasian women, and 2.53 for those with at least a college education.

Data from the Veterans Health Administration (VA) were used to estimate the utilization of outpatient care for urinary incontinence among female veterans accessing VA health services. Of all women who received outpatient care in the VA system, urinary incontinence as a percentage of any diagnosis was 2.7% in 1999, 3.6% in 2000, and 3.8% in 2001 (Table 6). These proportions are substantially lower than the rates of daily incontinence reported in population-based surveys, suggesting that the majority of women with incontinence do not seek medical care for it. As expected, the prevalence of medically recognized urinary incontinence increased with age, with the most marked increase occurring between the 25- to 34- year-olds and the 45- to 54-year-olds. Incontinence was more than twice as common among non-Hispanic whites as it was among African Americans and approximately 50% more common among non-Hispanic whites than among Hispanics. Incontinence was most common in the Western region of the United States and least common in the Eastern region, except in 2001, although these differences were not adjusted for differences in age or race/ethnicity.

Less is known about incontinence incidence, remission, and natural history. In prospective cohort studies using a survey design, 10% to 20% of women report remission or recurrence of incontinence over a 1- to 2-year-period (10). Whether this reflects the

Table 6. Frequency of urinary incontinence[a] listed as any diagnosis in female VA patients seeking outpatient care, count[b], rate[c]

	1999		2000		2001	
	Count	Rate	Count	Rate	Count	Rate
Total	3,780	2,679	5,426	3,597	6,196	3,757
Age						
18–24	23	387	20	348	22	378
25–34	213	796	223	839	237	888
35–44	777	1,882	1,020	2,449	1,052	2,489
45–54	968	3,262	1,531	4,374	1,817	4,440
55–64	469	4,194	697	5,506	827	5,600
65–74	401	4,405	543	5,858	637	5,744
75–84	849	5,412	1,261	6,927	1,440	6,828
85+	80	5,416	131	7,503	164	7,257
Race/ethnicity						
White	2,378	4,212	3,343	5,496	3,665	5,565
Black	406	2,152	511	2,491	562	2,518
Hispanic	83	3,257	102	3,608	117	3,767
Other	31	4,010	42	4,953	45	4,950
Unknown	882	1,412	1,428	2,169	1,807	2,485
Region						
Midwest	715	2,574	1,084	3,713	1,169	3,808
Northeast	672	2,338	862	2,842	1,036	3,162
South	1,354	2,584	2,083	3,682	2,294	3,606
West	1,039	3,228	1,397	4,020	1,697	3,162
Insurance status						
No insurance/self-pay	2,186	2,204	2,978	2,902	3,345	3,084
Medicare/Medicare supplemental	849	5,425	1,467	7,347	1,715	6,819
Medicaid	8	2,614	14	3,070	20	3,697
Private insurance/HMO/PPO	662	2,806	875	3,490	998	3,675
Other insurance	69	3,064	89	3,427	112	3,512
Unknown	6	4,196	3	2,239	6	1,435

HMO, health maintenance organization; PPO, preferred provider organization.

[a]Represents diagnosis codes for female urinary incontinence (including stress incontinence and fistulae).

[b]The term

not weighted to represent national population estimates.

[c]Rate is defined as the number of unique patients with each condition divided by the base population in the same fiscal year x 100,000 to calculate the rate per 100,000 unique outpatients.

NOTE: Race/ethnicity data from clinical observation only, not self-report; note large number of unknown values.

SOURCE: Outpatient Clinic File (OPC), VA Austin Automation Center, FY1999–FY2001.

natural history of incontinence, active intervention, or decreased physical activity (relevant to stress incontinence) is not clear.

HIGH-RISK GROUPS AND RISK FACTORS

Most data on risk factors for urinary incontinence come from clinical trials or cross-sectional studies using survey designs. Some risk factors have been more rigorously studied than others. Hence, the available information has limited generalizability and causality cannot be inferred from it. Bearing these limitations in mind, the literature does suggest that age, pregnancy, childbirth, obesity, functional impairment, and cognitive impairment are associated with increased rates of incontinence or incontinence severity. Some factors pertain more to certain age groups than to others. For example, in older women, childbirth disappears as a significant risk factor, possibly due to increased comorbidities and other intervening factors, such as diabetes, stroke, and spinal cord injury. Other factors about which less is known or findings are contradictory include hysterectomy, constipation, occupational stressors, smoking, and genetics.

TREATMENT

Fewer than half of the women with urinary incontinence report seeking medical care (11). Johnson and colleagues (12) found that the incontinent people most likely to contact a medical doctor are those who use pads, those who have large volume accidents, those who have impairment in activities of daily living; also, men are more likely to seek medical care than women are (Table 7). Many incontinent people practice behavioral modifications such as limiting trips, fluids, and routine activities. These restrictions are particularly striking in women with concomitant fecal incontinence (Table 8).

Most treatment for urge incontinence is nonsurgical. Common therapeutic modalities

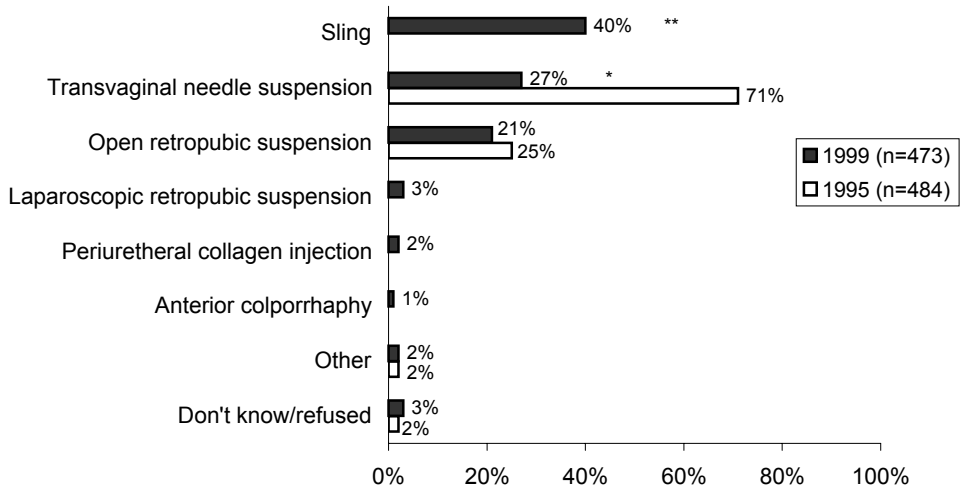

Figure 4. Most common surgical treatments in women with stress urinary incontinence associated with hypermobility, as indicated by practitioners treating females with urinary incontinence.

SOURCE: Adapted from O'Leary MP, Gee WF, Holtgrewe HL, Blute ML, Cooper TP, Miles BJ, Nellans RE, Thomas R, Painter MR, Meyer JJ, Naslund MJ, Gormley EA, Blizzard R, Fenninger RB, 1999 American Urological Association Gallup Survey: changes in physician practice patterns, treatment of incontinence and bladder cancer, and impact of managed care, Journal of Urology, 164, 1311–1316, Copyright 2000, with permission from Lippincott Williams & Wilkins.

Table 7. Relationship between disposable pad use and contacting an MD among subjects reporting urinary incontinence

	Contacting MD	
Factor	**Bivariate Odds Ratio (95% CI)**	**Multivariate Odds Ratio (95% CI)**
Disposable Pad Usage		
Non-user	1.0	1.0
User	2.81 (2.05–3.85)	3.02 (1.87–4.87)
Gender		
Female	1.0	1.0
Male	1.73 (1.28–2.36)	2.51 (1.58–4.01)
Age group		
70–79	1.0	1.0
80–89	1.12 (0.84–3.28)	1.12 (0.71–1.78)
90+	1.50 (1.00–2.24)	0.83 (0.46–1.51)
Severity of urinary incontinence		
Mild-Mod	1.0	
Severe	2.77 (2.00–3.86)	NS
How often have difficulty holding		
Less than 1/wk	1.0	
More than 1/wk	1.60 (1.42–1.81)	NS
Ever leak/lose urine with cough/laugh		
No	1.0	
Yes	1.05 (0.76–1.44)	NS
How often lose urine completely		
Never	1.0	1.0
Sometimes	1.99 (1.42–2.80)	1.90 (1.18–3.07)
Often	3.53 (2.01–6.19)	2.45 (1.00–6.00)
Mobility ADL		
No impairment	1.0	
Impairment	3.48 (2.28–5.29)	NS
Instrumental ADL		
Not impaired	1.0	1.0
Impairment	3.07 (2.08–4.54)	3.22 (1.83–5.68)
Basic ADL		
Not impaired	1.0	1.0
Impairment	1.48 (1.00–2.18)	0.38 (0.19–0.78)
Bowel incontinence		
None	1.0	
Weekly	2.77 (2.00–3.86)	NS

NS, not significant; ADL, activity of daily living.
95% confiden
variables significant at $\alpha = 0.10$.

For multivariate analysis, age and gender variables were forced into all final models because they were the stratification variables of the sample.
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Geriatrics Society, 48, 894–902, Copyright 2000, with permission from the American Geriatrics Society.

Table 8. National estimates of self-care practice for those with urinary incontinence, by presence of fecal incontinence, severity of urinary incontinence, and gender

	All UI (95% CI)	UI without Fecal Incontinence[a] (95% CI)	UI with Fecal Incontinence (95% CI)	Mild or Moderate UI (95% CI)	Severe UI (95% CI)	Women with UI (95% CI)	Men with UI (95% CI)
In the last 12 months have you used:							
Disposable pads	36.8% (31.0–42.7)	33.6% (28.2–38.9)	45.2% (19.6–70.9)	27.7% (22.4–32.9)	60.1% (45.9–74.3)	44.5% (36.9–52.1)	15.1% (8.1–22.1)
Laundry service	2.3% (0.8–3.8)	2.5% (0.7–4.1)	1.7% (0.0–4.4)	1.7% (0.4–3.1)	3.9% (0.0–8.5)	1.6% (0.4–2.8)	4.2% (0.0–8.8)
Plastic sheets	11.2% (7.3–15.1)	9.5% (6.1–12.8)	39.6% (19.3–59.9)	7.1% (3.0–11.2)	20.6% (10.4–30.8)	11.3% (7.1–15.4)	11.0% (5.0–17.0)
Changed day-to-day routine activities:							
Limited trips	27.6% (19.6–35.5)	21.4% (16.7–26.0)	56.2% (37.5–74.9)	15.2% (10.6–19.9)	55.8% (40.4–71.2)	25.6% (17.0–34.2)	33.0% (22.4–43.7)
Limited uids	36.6% (30.3–43.0)	32.6% (27.9–37.2)	57.6% (40.3–74.9)	29.3% (24.2–34.4)	55.3% (39.6–71.0)	39.4% (31.7–47.0)	28.5% (19.5–37.6)
Bladder exercise	11.7% (7.8–15.5)	12.5% (8.7–16.3)	8.1% (0.0–20.0)	10.4% (7.0–13.9)	15.9% (6.1–25.8)	14.2% (9.7–18.9)	4.3% (1.0–7.7)
Contacted an MD	39.8% (32.2–47.4)	34.5% (29.0–40.2)	62.9% (43.6–82.2)	31.2% (25.3–37.0)	59.2% (44.8–73.6)	37.1% (28.9–45.6)	47.4% (35.8–59.0)
Has someone helped you manage by:							
Changing disposable pads	15.3% (8.3–22.3)	11.3% (5.0–17.7)	60.1% (26.2–93.9)	12.9% (5.0–20.8)	16.4% (3.1–29.7)	11.4% (4.8–18.0)	47.6% (20.8–74.3)
Any assistance[b]	23.2% (18.4–28.0)	21.2% (17.1–25.4)	63.8% (43.6–84.2)	18.8% (13.7–24.0)	34.3% (20.6–47.9)	21.1% (15.6–26.7)	31.7% (22.7–40.6)

[a] Excludes all subj

[b] Any assistance includes receiving diet and exerc

SOURCE: Reprinted from Johnson TM, Kincade
Results from the national follow-up survey on self-care a
Society.

Table 9. Age-specific incidence[a] (annual procedure rate) of surgically managed prolapse and incontinence per 1000 woman-years

Age Group (y)	Population of Women at Risk	All Cases (n = 384)	POP Only (n = 152)	UI Only (n = 138)	POP + UI (n = 82)
20–29	23,770	0.08	0.04	0.04	
30–39	30,358	0.96	0.30	0.43	0.23
40–49	35,828	2.68	0.87	1.23	0.59
50–59	24,242	3.30	1.24	1.24	0.83
60–69	16,231	5.24	2.28	1.60	1.36
70–79	12,236	6.62	3.43	1.72	1.47
≥ 80	6,889	1.60	0.73	0.44	0.44
Total	149,554	2.63			

POP, pelvic organ prolapse; UI, urinary incontinence.

[a]Includes primary and repeat procedures.

SOURCE: Reprinted with permission from the American College of Obstetricians and Gynecologists (Obstetrics and Gynecology, 1997, 89, 501–506).

include pharmacologic treatment, physiotherapy, biofeedback, bladder retraining, and electrical stimulation. For women with intractable, severe urge incontinence, direct neuromodulation of the sacral spinal cord is an increasingly popular option. Surgical therapy designed to increase bladder capacity and decrease contractility is rarely used.

In contrast, surgery is a mainstay of therapy for stress urinary incontinence. Surgeries performed frequently for stress incontinence in the past —anterior colporrhaphies and needle suspension procedures — have more recently been supplanted by retropubic urethropexies, pubovaginal slings (using various types of sling materials), and collagen injections. Based on available evidence that the long-term (3 to 5 years) success rate of anterior colporrhaphy and needle suspension procedures is significantly lower than that of the other two procedures, the Agency for Healthcare Research and Quality (AHRQ), (13) and the American Urological Association (14) have both taken the position that retropubic urethropexies and pubovaginal slings are the procedures of choice for stress incontinence. This trend is seen clearly in a study describing the trends in surgical management by American urologists between 1995 and 1999 (15) (Figure 4).

Nonsurgical therapies are also prominent in the treatment of women with stress urinary incontinence. The primary modality used is pelvic muscle rehabilitation ("Kegel exercises"). Vaginal and urethral devices, bladder training, and biofeedback are also frequently used. In the near future, new pharmacologic agents will be available as well.

While nonsurgical therapies for urge and stress urinary incontinence render only a minority of women completely dry, more than half of the women who participate in trials that assess such therapies report at least a 50% improvement in incontinence episodes. There is Level 1 evidence to support the use of pelvic muscle rehabilitation, bladder training, and anticholinergic therapy in women with some types of urinary incontinence. However, the literature on large, well-designed trials that are generalizable to the population seeking care is limited. Data are lacking on the long-term follow-up of nonsurgical treatment.

TRENDS IN HEALTH CARE RESOURCE UTILIZATION

Inpatient Care

Surgical Treatment

Surgical treatment for urinary incontinence can be more easily tracked in existing databases than can non-surgical management. Surgical therapy accounts for a considerable proportion of the cost related to incontinence. Although only a small fraction of all women with urinary incontinence seek surgical intervention, the number of women treated with surgery is substantial. Using a large managed-care database, Olsen and colleagues (1997) reported an 11.1% lifetime risk of undergoing a single operation for urinary incontinence or pelvic organ prolapse by age 80 (Table 9) (16). Using data from the 1998 National Hospital Discharge Survey and the 1998 National Census, Waetjen and colleagues (2003) calculated that approximately 135,000 women in the United States had inpatient surgery for stress urinary incontinence in 1998 (17).

Data from the Healthcare Cost and Utilization Project (HCUP) indicate that the annual rate of hospitalizations for a primary diagnosis of urinary incontinence remained stable at 51 to 54 per 100,000 between 1994 and 1998, then dropped to 44 per 100,000 in 2000 (Table 10). It is unclear whether this drop reflects an actual trend, potentially attributable to newer ambulatory surgical techniques. The annual rate of hospitalizations was higher for women 45 to 84

Table 10. Inpatient hospital stays[a] by adult females with urinary incontinence listed as primary diagnosis, count, rate[b] (95% CI)

	1994		1996		1998		2000	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate
Total[c,d]	49,338	51 (48–54)	54,527	54 (51–58)	53,226	52 (48–56)	46,470	44 (41–47)
Age								
18–24	211	1.7 (1.1–2.3)	*	*	*	*	*	*
25–34	2,312	11 (10–13)	2,112	10 (8.9–12)	2,176	11 (10–12)	1,770	9.2 (8.0–10)
35–44	8,828	43 (39–47)	9,442	43 (40–47)	9,104	41 (37–44)	8,480	37 (34–41)
45–54	12,880	88 (81–94)	15,481	95 (89–102)	14,589	84 (77–90)	12,365	66 (61–71)
55–64	10,187	96 (88–104)	10,952	100 (92–107)	11,975	103 (95–112)	10,213	83 (76–90)
65–74	10,665	108 (99–117)	11,328	113 (104–121)	10,419	105 (97–114)	8,735	90 (81– 98)
75–84	3,908	67 (60–73)	4,585	72 (64–79)	4,322	64 (58–70)	4,360	63 (56–71)
85+	347	18 (14–23)	518	27 (19–34)	486	25 (20–31)	444	21 (16–26)
Race/ethnicity								
White	34,245	47 (44–50)	37,576	50 (47–53)	35,716	47 (44–51)	30,434	40 (37–43)
Black	1,266	11 (8.4–14)	1,426	12 (9–14)	1,483	12 (9.4–14)	1,119	8.7 (7.3–10)
Asian/Pacific Islander	260	9.5 (6.6–12)	220	6.5 (4.4–8.5)	307	8.1 (5.5–11)	276	6.8 (4.7–9.0)
Hispanic	1,965	24 (20–28)	2,510	28 (22–34)	2,262	23 (19–27)	2,869	27 (23–31)
Region								
Midwest	12,123	53 (46–59)	11,916	51 (45–57)	11,999	50 (44–57)	10,420	44 (37–50)
Northeast	6,809	34 (29–38)	8,839	44 (38–50)	8,380	41 (34–49)	8,051	39 (32–46)
South	18,024	55 (49–61)	22,237	62 (56–69)	21,300	59 (52–65)	17,741	48 (43–53)
West	12,381	61 (53–69)	11,535	55 (47–62)	11,547	53 (45–60)	10,258	44 (37–51)
MSA								
Rural	8,272	34 (29–40)	9,356	41 (36–47)	9,961	43 (37–50)	7,307	32 (27–37)
Urban	40,810	57 (53–61)	44,881	58 (54–62)	42,906	54 (50–58)	39,095	48 (44–52)
Discharge Status								
Routine	46,483	48 (45–51)	51,370	51 (48–55)	50,372	49 (46–53)	44,518	42 (39–46)
Short-term	*	*	*	*	*	*	*	*
Skilled nursing facility	255	0.3 (0.2–0.4)	294	0.3 (0.2–0.4)	…	…	…	…
Intermediate care	*	*	*	*	…	…	…	…
Other facility	*	*	*	*	579	0.6 (0.4–0.7)	347	0.3 (0.2–0.4)
Home health care	2,202	2.3 (1.9–2.6)	2,571	2.6 (2.2–3.0)	2,184	2.1 (1.8–2.5)	1,518	1.4 (1.2–1.7)
Against medical advice	*	*	*	*	*	*	*	*
Died	*	*	*	*	*	*	*	*

… data not available.

*Figure does not meet standard of reliability or precision.

MSA, metropolitan statistical area.

[a]Excludes hospitalizations associated with a primary gynecological diagnosis (e.g., pelvic organ prolapse).

[b]Rate per 10

Corporation, for relevant demographic categories of US female adult civilian non-institutionalized population.

[c]Counts may not add to totals because of rounding.

[d]Persons of other races, missing or unavailable race and ethnicity, and missing MSA are included in the totals.

NOTE: Counts may not sum to totals due to rounding.

SOURCE: Healthcare Cost and Utilization Project Nationwide Inpatient Sample, 1994, 1996, 1998, 2000.

Table 11. Inpatient stays by female Medicare beneficiaries with urinary incontinence listed as primary diagnosis, count[a], rate[b] (95% CI)

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total all ages[c]	16,160	82 (80–83)	19,840	98 (97–100)	17,700	93 (92–94)
Total < 65	1,240	52 (49–55)	2,520	94 (90–97)	2,520	91 (87–94)
Total 65+	14,920	86 (84–87)	17,320	99 (98–100)	15,180	93 (92–95)
Age						
65–74	9,780	106 (104–109)	11,300	126 (123–128)	9,320	118 (116–120)
75–84	4,380	74 (72–76)	5,220	87 (85–90)	5,100	87 (85–90)
85–94	760	37 (34–39)	740	33 (31–36)	700	31 (29–34)
95+	0	0.0	60	21 (16–26)	60	19 (15–24)
Race/ethnicity						
White	14,820	88 (87–90)	18,520	107 (105–108)	16,540	102 (101–104)
Black	460	27 (25–30)	640	35 (32–38)	600	34 (31–37)
Asian	…	…	20	21 (12–31)	120	68 (56–80)
Hispanic	…	…	160	80 (67–92)	260	71 (62–79)
N. American Native	…	…	20	124 (68–179)	40	153 (107–199)
Region						
Midwest	4,940	98 (96–101)	5,200	101 (98–104)	4,780	97 (94–100)
Northeast	2,020	45 (43–47)	2,640	59 (57–61)	2,340	60 (57–62)
South	5,840	84 (81–86)	7,880	109 (107–111)	7,540	107 (105–110)
West	3,300	116 (112–120)	3,880	136 (131–140)	2,980	110 (106–114)

… data not available.

[a]Unweighted counts multiplied by 20 to arrive at values in the table.

[b]Rate per 100,000 Medicare beneficiaries in the same demographic stratum.

[c]Persons of other races, unknown race and ethnicity, and other region are included in the totals.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, MedPAR and 5% Carrier File, 1992, 1995, 1998.

years of age, peaking in the 65 to 74 age group at 108 per 100,000 (Figure 5). Hospitalizations were most common in women residing in the South and West and least common in women living in the Northeast. Women living in urban areas had a higher rate of hospitalizations than did those in rural areas. Most of the hospitalizations for urinary incontinence were probably for surgical treatments.

The number of hospitalizations in Table 10 represents roughly one-half of the number of incontinence procedures reported by Waetjen, et. al. This is most likely due to the fact that Waetjen included inpatient stays in which the primary diagnosis was gynecological (such as pelvis organ prolapse) and in whom an incontinence procedure was done in concert with other procedures to repair the primary gynecological problem. Future analyses will address this issue.

Similar trends for older women were found in Medicare (Table 11) and HCUP (Table 10). The rate of inpatient stays for urinary incontinence for older women enrolled in Medicare (those 65+) ranged from 86 to 99 per 100,000 annually, with women between 65 and 74 more likely than the other age groups to be hospitalized. Geographic and racial/ethnic distributions were similar to those found in HCUP and significant differences among racial/ethnic groups were also noted.

Among women with commercial health insurance, the rate of inpatient hospitalizations for incontinence procedures (primary or any procedure) ranged from 123 per 100,000 women in 1994 to 114 per 100,000 in 2000 (Table 12). Most of these procedures were performed in conjunction with other surgical procedures and are thus listed as any procedure. Hospitalizations for incontinence surgeries as primary

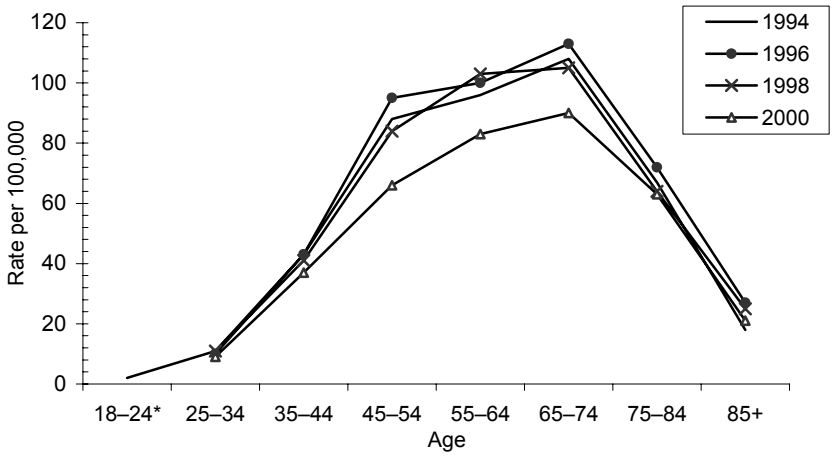

Figure 5. National inpatient hospital stays by females with urinary incontinence listed as primary diagnosis, by age and year.

SOURCE: Healthcare Cost and Utilization Project, 1994, 1996, 1998, 2000.

Table 12. Inpatient procedures for females with urinary incontinence having commercial health insurance, count[a], rate[b]

	1994		1996		1998		2000	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate
	As Primary Procedure							
Total	230	59	307	53	355	40	334	33
Age								
18–24	0	*	2	*	0	*	0	*
25–34	18	*	16	*	14	*	25	*
35–44	62	54	66	39	100	39	77	27
45–54	97	120	134	106	136	66	116	47
55–64	42	112	79	138	94	95	96	79
65–74	9	*	9	*	10	*	18	*
75–84	1	*	1	*	1	*	2	*
85+	1	*	0	*	0	*	0	*
	As Any Procedure							
Total	483	123	749	130	1,034	115	1,167	114
Age								
18–24	0	*	3	*	2	*	0	*
25–34	38	38	48	34	72	35	74	33
35–44	170	147	253	151	319	125	348	124
45–54	187	232	301	238	407	197	443	180
55–64	72	191	123	214	203	205	249	204
65–74	14	*	18	*	26	*	49	264
75–84	1	*	3	*	5	*	3	*
85+	1	*	0	*	0	*	1	*

*Figure does not meet standard for reliability or precision.

[a]Counts less than 30 should be interpreted with caution.

[b]Rate per 100,000 based on member months of enrollment in calendar years for females in the same demographic stratum.

SOURCE: Center for Health Care Policy and Evaluation, 1994, 1996, 1998, 2000.

Table 13. Trends in mean inpatient length of stay (days) for adult females hospitalized with urinary incontinence listed as primary diagnosis

	Length of Stay			
	1994	1996	1998	2000
All	3.1	2.6	2.4	2.1
Age				
18–24	2.7	*	*	*
25–34	2.9	2.5	2.2	2.1
35–44	3.0	2.4	2.3	2.1
45–54	3.1	2.5	2.3	2.1
55–64	3.0	2.5	2.3	2.1
65–74	3.3	2.7	2.5	2.1
75–84	3.7	2.9	2.7	2.7
85+	3.9	3.5	2.7	2.9
Race/ethnicity				
White	3.2	2.6	2.3	2.1
Black	3.2	2.7	2.5	2.3
Asian/Pacific Islander	2.7	2.7	2.1	2.2
Hispanic	3.1	2.6	2.5	2.4
Other	3.3	2.5	2.5	2.1
Region				
Midwest	3.1	2.6	2.4	2.1
Northeast	3.7	2.8	2.3	2.0
South	3.2	2.6	2.4	2.2
West	2.7	2.3	2.4	2.2
MSA				
Rural	3.4	2.6	2.3	2.4
Urban	3.1	2.5	2.4	2.1
Discharge status				
Routine	3.1	2.5	2.3	2.1
Short-term	*	*	*	*
Skilled nursing facility	5.0	4.5	…	…
Immediate care	*	*	…	…
Other facility	*	*	5.4	6.6
Home health care	3.9	3.3	3.0	2.8
Against medical advice	*	*	*	*
Died	*	*	*	*

….data not available.

*Figure does not meet standard for reliability or precision.

MSA, metropolitan statistical area.

SOURCE: Healthcare Cost and Utilization Project Nationwide Inpatient Sample, 1994, 1996, 1998, 2000.

procedures ranged from 59 per 100,000 women in 1994 to 33 per 100,000 in 2000. These data suggest a trend toward decreasing numbers of inpatient surgeries for incontinence; if this trend is substantiated in future years, it may reflect either the increased emphasis on nonsurgical treatment for urinary incontinence that followed the dissemination of the AHRQ guidelines or increased utilization of ambulatory incontinence surgeries.

Consistent with decreasing lengths of inpatient stay for other conditions during the past decade, length of stay for women with urinary incontinence as their primary discharge diagnosis decreased steadily, from 3.1 days in 1994 to 2.1 days in 2000 (Table 13). Women in the oldest age groups were hospitalized longer than were those younger than 75. For example, in 2000, length of stay remained stable at 2.1 days in women between 18 and 74 years of age, and varied from 2.7 to 2.9 days in women older than 75. Length of stay was similar across racial/ethnic groups and regions of the country.

Surgical Procedures

In 1998, the most commonly performed surgical procedures for female urinary incontinence were collagen injections, pubovaginal slings, and anterior urethropexies (Table 14). Because anterior colporrhaphies may be performed for either urinary incontinence (a condition for which they are not a currently recommended treatment) or anterior pelvic organ prolapse (cystocele), rates for this procedure are not described. A striking decrease was seen in both Raz and Peyrera needle suspension procedures between 1992 and 1998: Raz procedures decreased from 4,364 per 100,000 women in 1992 to 1,564 per 100,000 in 1998, while Peyrera procedures were done too infrequently by 1998 to be detected in the data. Concomitantly, pubovaginal slings increased from 621 per 100,000 women in 1995 to 2,776 per 100,000 in 1998. The number of women undergoing anterior urethropexy decreased, though less dramatically, from 3,941 per 100,000 women in 1992 to 2,364 per 100,000 in 1998.

Despite an increase in cesarean deliveries and complex laparoscopic pelvic surgeries (two major sources of urogenital fistulae) during the time frame studied, national hospitalization data showed no increase in hospitalizations for urinary incontinence

Table 14. Surgical procedures used to treat urinary incontinence among female adult Medicare beneficiaries, count[a], rate[b]

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total	18,820	10,475	32,880	13,096	36,400	11,033
Anterior urethropexy, (e.g., MMK)	7,080	3,941	8,180	3,258	7,800	2,364
Ambulatory surgery center	160	89	360	143	580	176
Inpatient	6,720	3,740	7,740	3,082	7,200	2,182
Hospital outpatient	60	33	0	0.0	0	0.0
Physician office	140	78	80	32	20	6
Raz-type suspension	7,840	4,364	10,540	4,198	5,160	1,564
Ambulatory surgery center	360	200	600	239	720	218
Inpatient	7,400	4,119	9,780	3,895	4,400	1,333
Hospital outpatient	20	11	0	0.0	0	0.0
Physician office	60	33	160	64	40	12
Laparoscopic repair	0	0.0	0	0.0	0	0.0
Ambulatory surgery center	0	0.0	0	0.0	0	0.0
Inpatient	0	0.0	0	0.0	0	0.0
Hospital outpatient	0	0.0	0	0.0	0	0.0
Physician office	0	0.0	0	0.0	0	0.0
Collagen injection	0	0.0	9,300	3,704	12,040	3,649
Ambulatory surgery center	0	0.0	7,900	3,146	9,120	2,764
Inpatient	0	0.0	220	88	140	42
Hospital outpatient	0	0.0	300	119	360	109
Physician office	0	0.0	880	350	2,420	733
Hysterectomy with colpo-urethropexy	1,920	1,069	2,220	884	1,480	449
Ambulatory surgery center	0	0.0	0	0.0	0	0.0
Inpatient	1,920	1,069	2,220	884	1,480	449
Hospital outpatient	0	0.0	0	0.0	0	0.0
Physician office	0	0.0	0	0.0	0	0.0
Pubovaginal sling	640	356	1,560	621	9,160	2,776
Ambulatory surgery center	80	45	140	56	1,240	376
Inpatient	540	301	1,400	558	7,800	2,364
Hospital outpatient	0	0.0	0	0.0	0	0.0
Physician office	20	11	20	8	120	36
Peyrera procedure	1,280	712	820	327	540	164
Ambulatory surgery center	0	0.0	20	8	60	18
Inpatient	1,280	712	800	319	480	145
Hospital outpatient	0	0.0	0	0.0	0	0.0
Physician office	0	0.0	0	0.0	0	0.0
Kelly plication	60	33	260	104	220	67
Ambulatory surgery center	0	0.0	0	0.0	0	0.0
Inpatient	60	33	260	104	220	67
Hospital outpatient	0	0.0	0	0.0	0	0.0
Physician office	0	0.0	0	0.0	0	0.0

[a]Unweighted counts multiplied by 20 to arrive at values in the table.

[b]Rate per 100,000 female adult Medicare beneficiaries with a diagnosis of urinary incontinence.

NOTE: Confidence intervals could not be calculated because of multiple data sources.

SOURCE: Centers for Medicare and Medicaid Services, 5% File, 1992, 1995, 1998.

Table 15. Inpatient hospital stays for adult females with urinary incontinence caused by urinary fistulae listed as primary diagnosis, count, rate[a] (95% CI)

	1994		1996		1998		2000	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate
Total[b]	6,689	6.9 (6.4–7.5)	7,589	7.6 (7.0–8.1)	6,813	6.7 (6.2–7.2)	7,031	6.7 (6.2–7.2)
Age								
18–24	294	2.4 (1.6–3.1)	217	1.7 (1.2–2.3)	186	1.5 (0.9–2.0)	*	*
25–34	1,133	5.5 (4.7–6.4)	1,037	5.1 (4.2–5.9)	787	4.0 (3.2–4.7)	791	4.1 (3.4–4.8)
35–44	1,054	5.2 (4.1–6.2)	1,278	5.9 (4.9–6.8)	1,186	5.3 (4.5–6.1)	1,268	5.6 (4.9–6.3)
45–54	732	5.0 (4.0–6.0)	894	5.5 (4.5–6.6)	922	5.3 (4.4–6.2)	1,216	6.5 (5.5–7.5)
55–64	828	7.8 (6.5–9.1)	948	8.6 (7.2–10)	852	7.4 (6.1–8.6)	895	7.3 (6.1–8.5)
65–74	1,257	13 (11–14)	1,424	14 (12–16)	1,204	12 (10–14)	1,133	12 (10–13)
75–84	1,021	17 (15–20)	1,366	21 (18–24)	1,194	18 (15–20)	1,131	16 (14–19)
85+	370	20 (15–24)	425	22 (17–27)	483	25 (19–31)	452	22 (17–26)
Race/ethnicity								
White	4,312	5.9 (5.4–6.4)	4,932	6.6 (6.0–7.1)	4,048	5.4 (4.8–5.9)	4,071	5.3 (4.8–5.8)
Black	482	4.2 (3.2–5.1)	675	5.6 (4.3–6.9)	533	4.3 (3.3–5.3)	565	4.4 (3.5–5.3)
Asian/Pacific Islander	*	*	*	*	*	*	*	*
Hispanic	253	3.1 (2.1–4.0)	331	3.7 (2.3–5.0)	331	3.4 (2.2–4.6)	361	3.4 (2.5–4.3)
Region								
Midwest	1,861	8.1 (6.9–9.3)	2,038	8.7 (7.2–10)	1,701	7.2 (5.8–8.6)	1,676	7.0 (6.1–8.0)
Northeast	1,380	6.8 (5.8–7.8)	1,500	7.5 (6.4–8.6)	1,177	5.8 (4.9–6.7)	1,488	7.2 (6.1–8.3)
South	2,246	6.8 (6.0–7.7)	2,842	8.0 (7.0–8.9)	2,768	7.6 (6.8–8.4)	2,617	7.0 (6.2–7.9)
West	1,202	5.9 (4.8–7.0)	1,208	5.7 (4.8–6.7)	1,167	5.3 (4.4–6.2)	1,250	5.4 (4.6–6.2)

*Figure does not meet standard of reliability or precision.

[a]Rate per 100,000 based on 1994, 1996, 1998, 2000
categories of US female adult civilian non-institutionalized population.

[b]Persons of other races and missing or unavailable race and ethnicity are included in the totals.

NOTE: Counts may not sum to totals due to rounding.

SOURCE: Healthcare Cost and Utilization Project Nationwide Inpatient Sample, 1994, 1996, 1998, 2000.

Table 16. Total national physician office visits by adult females with urinary incontinence, count, rate[a] (95% CI)

	Primary Diagnosis		Any Diagnosis	
Year	Count	Rate	Count	Rate
1992	451,704	468 (252–683)	815,832	845 (480–1,210)
1994	549,827	571 (388–753)	1,048,115	1,088 (791–1,384)
1996	937,275	934 (600–1,267)	1,402,830	1,398 (992–1,803)
1998	1,332,053	1,302 (899–1,705)	2,004,851	1,960 (1,424–2,495)
2000	1,159,877	1,107 (722–1,490)	1,932,768	1,845 (1,313–2,375)

[a]Rate per 100,000 based on 1994, 1996, 1998, 2000 population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation, for relevant demographic categories of US female adult civilian non-institutionalized population.

SOURCE: National Ambulatory Medical Care Survey, 1992, 1994, 1996, 1998, 2000.

due to fistulae (Table 15). This rate remained steady at 6.7 to 7.6 per 100,000 women between 1994 and 2000. However, although the rate is low, 7,000 hospitalizations for incontinence due to fistulae are estimated to occur each year nationwide, suggesting that further attention should be paid to prevention.

Outpatient Care

Outpatient and Emergency Room Visits

While the rate of hospitalizations for incontinence surgeries decreased, outpatient visits for urinary incontinence more than doubled between 1992 and 2000 for women both with and without Medicare. Physician visits with urinary incontinence listed as any reason for the visit climbed from 845 per 100,000 women in 1992 to 1,845 per 100,000 in 2000, according to National Ambulatory Medical Care Survey (NAMCS) data (Table 16). Similarly, visits for which incontinence was the primary reason rose from 468 per 100,000 in 1992 to 1,107 per 100,000 in 2000. Office visits for incontinence by women ages 65 and over enrolled in Medicare rose from 1,371 per 100,000 in 1992 to 2,937 per 100,000 in 1998 (Table 17). While the reason for this increase is unknown, at least two potentially related events occurred. AHRQ published its first clinical practice guidelines on urinary incontinence in 1992; these were widely promulgated and may have led to more visits. Second, several new anticholinergic medications for urge incontinence were approved during the late 1990s. The releases of the first new medications for incontinence in several decades were accompanied by major direct-to-consumer advertising campaigns. Thus visits may also have increased because more women became aware that treatment existed. However, this illustrates the difficulty in comparing rates across data sets. Table 3 shows that 38% of elderly women report having UI. Table 8 suggests that 40% of women with UI report seeing a physician. However, in 1998, only 3% of Medicare female beneficiaries had a physician visit for UI. Thus it would appear that people over-report seeing a doctor, UI is under-reported on billing data, or some combination of the two.

Not surprisingly, given the nonemergent nature of urinary incontinence, few women seek emergency room care for it. Only 11 per 100,000 women ages 65 and older enrolled in Medicare were evaluated in emergency room settings for this disorder in 1998.

Ambulatory Surgery

Ambulatory surgical center visits for female urinary incontinence also increased, particularly in women younger than 65. Among those with commercial health insurance, the rate of such visits increased from 15 per 100,000 in 1994 to 34 per 100,000 in 2000 (Table 18). A steady increase was seen in middle-aged women; the rate of ambulatory surgical visits by women 55 to 64 years of age increased from 61 per 100,000 in 1996 to 69 per 100,000 in 1998 and 77 per 100,000 in 2000. Older women also had more ambulatory surgical visits; the rate of such visits by women 65 and older enrolled in Medicare in 1998 was 142 per 100,000 (Table 19). The increased rate of ambulatory surgery is probably due to the

Table 17. Physician office visits by female Medicare beneficiaries with urinary incontinence listed as primary diagnosis, count[a], rate[b] (95% CI)

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total all ages[c]	257,740	1,301 (1,296–1,306)	393,680	1,951 (1,945–1,957)	522,240	2,741 (2,733–2,748)
Total < 65	18,780	786 (775–797)	32,280	1,201 (1,188–1,214)	44,200	1,591 (1,577–1,606)
Total 65+	238,960	1,371 (1,366–1,377)	361,400	2,066 (2,059–2,073)	478,040	2,937 (2,928–2,945)
Age						
65–74	118,140	1,285 (1,278–1,293)	177,840	1,976 (1,967–1,985)	214,960	2,720 (2,709–2,732)
75–84	93,340	1,583 (1,572–1,593)	139,240	2,326 (2,314–2,338)	200,720	3,436 (3,421–3,451)
85–94	26,640	1,283 (1,268–1,299)	42,260	1,901 (1,883–1,918)	59,820	2,689 (2,668–2,710)
95+	840	326 (304–348)	2,060	728 (696–759)	2,540	819 (787–850)
Race/ethnicity						
White	236,320	1,408 (1,402–1,414)	363,440	2,094 (2,088–2,101)	480,900	2,972 (2,964–2,981)
Black	11,020	654 (641–666)	16,520	898 (884–912)	23,040	1,306 (1,289–1,323)
Asian	…	…	1,260	1,335 (1,262–1,408)	2,660	1,503 (1,447–1,560)
Hispanic	…	…	3,120	1,553 (1,499–1,607)	7,160	1,948 (1,903–1,993)
N. American Native	…	…	320	1,980 (1,764–2,197)	300	1,150 (1,020–1,281)
Region						
Midwest	66,100	1,317 (1,307–1,327)	99,840	1,936 (1,924–1,948)	134,480	2,726 (2,712–2,740)
Northeast	50,440	1,113 (1,103–1,123)	74,920	1,667 (1,655–1,679)	89,600	2,287 (2,272–2,302)
South	94,740	1,356 (1,347–1,364)	149,500	2,069 (2,059–2,080)	206,340	2,940 (2,928–2,953)
West	45,000	1,578 (1,564–1,593)	66,900	2,336 (2,319–2,354)	88,700	3,264 (3,243–3,285)

… data not available.

[a]Unweighted counts multiplied by 20 to arrive at values in the table.

[b]Rate per 100,000 Medicare beneficiaries in the same demographic stratum.

[c]Persons of other races, unknown race and ethnicity, and other region are included in the totals.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, 5% Carrier and Outpatient Files, 1992, 1995, 1998.

Table 18. Visits to ambulatory surgery centers for urinary incontinence procedures listed as any procedure by adult females having commercial health insurance, count[a], rate[b] (95% CI)

	1994		1996		1998		2000	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate
Total	60	15	185	32	278	31	351	34
Age								
18–24	0	*	1	*	1	*	0	*
25–34	3	*	7	*	15	*	19	*
35–44	17	*	45	27	71	28	91	32
45–54	25	*	80	63	103	50	128	52
55–64	11	*	35	61	68	69	94	77
65–74	3	*	11	*	17	*	14	*
75–84	0	*	2	*	3	*	4	*
85+	1	*	4	*	0	*	1	*

*Figure does not meet standard for reliability or precision.

[a]Counts less than 30 should be interpreted with caution.

[b]Rate per 100,000 based on member months of enrollment in calendar year for adult females in the same demographic stratum.

SOURCE: Center for Health Care Policy and Evaluation, 1994, 1996, 1998, 2000.

Table 19. Visits to ambulatory surgery centers by female Medicare beneficiaries with urinary incontinence listed as primary diagnosis, count[a], rate[b] (95% CI)

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total all ages[c]	11,580	58 (57–60)	24,680	122 (121–124)	25,820	135 (134–137)
Total < 65	1,140	48 (45–50)	2,260	84 (81–88)	2,740	99 (95–102)
Total 65+	10,440	60 (59–61)	22,420	128 (126–130)	23,080	142 (140–144)
Age						
65–74	5,900	64 (63–66)	11,880	132 (130–134)	10,780	136 (134–139)
75–84	3,800	64 (62–66)	8,420	141 (138–144)	9,680	166 (162–169)
85–94	720	35 (32–37)	2,080	94 (90–98)	2,500	112 (108–117)
95+	20	7.8 (4.3–11)	40	14 (9.9–18)	120	39 (32–45)
Race/ethnicity						
White	10,460	62 (61–64)	23,120	133 (132–135)	24,480	151 (149–153)
Black	600	36 (33–38)	900	49 (46–52)	860	49 (46–52)
Asian	…	…	60	64 (48–79)	80	45 (35–55)
Hispanic	…	…	60	30 (22–37)	240	65 (57–73)
N. American Native	…	…	40	248 (173–322)	…	…
Region						
Midwest	4,100	82 (79–84)	8,620	167 (164–171)	8,360	169 (166–173)
Northeast	2,400	53 (51–55)	4,500	100 (97–103)	4,820	123 (120–126)
South	4,120	59 (57–61)	9,580	133 (130–135)	10,160	145 (142–148)
West	960	34 (32–36)	1,960	68 (65–71)	2,480	91 (88–95)

… data not available.

[a]Unweighted counts multiplied by 20 to arrive at values in the table.

[b]Rate per 100,0000 Medicare beneficiaries in the same demographic stratum.

[c]Persons of other races, unknown race and ethnicity, and other region are included in the totals.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, 5% Carrier and Outpatient Files, 1992, 1995, 1998.

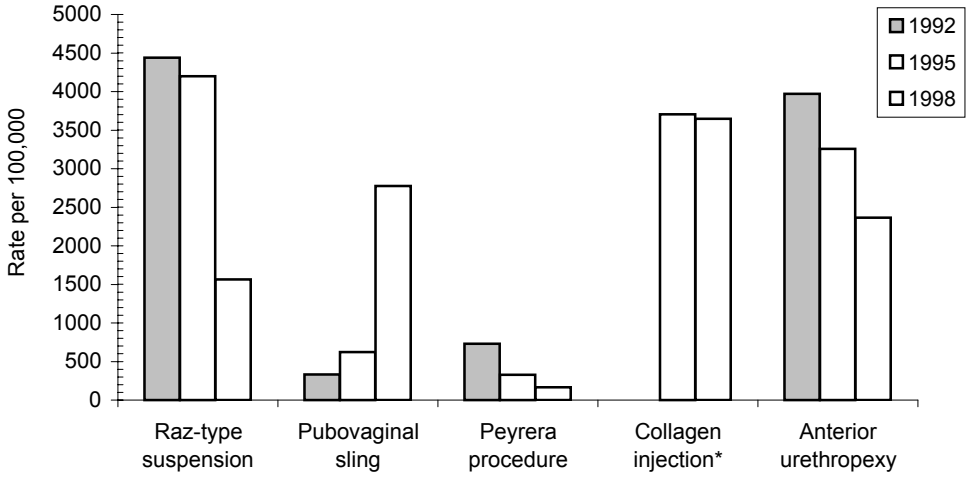

Figure 6. Rate of surgical procedures used to treat urinary incontinence among female Medicare beneficiaries. *Collagen injection introduced in 1993.

SOURCE: Centers for Medicare and Medicaid Services, 1992, 1995, 1998.

wider use of endoscopic injections such as collagen to treat urinary incontinence in women. Collagen for this purpose was not available in 1992, but by 1995 3,704 per 100,000 women enrolled in Medicare were undergoing this therapy. This rate has since plateaued (Table 14 and Figure 6).

Nursing Home Care

Incontinence is particularly a problem in the frail elderly and is exacerbated by dementia, functional limitations, and comorbid conditions. In the United States, identification of incontinence by the Minimum Data Set (developed by the US Health Care Financing Administration) within 14 days of nursing home admission is mandated (18).

According to data collected by the National Nursing Home Survey (NNHS), the rate of women in nursing homes with an admitting or current diagnosis of urinary incontinence has remained fairly stable; the most recent estimate (for 1999) is 1,366 per 100,000. The rate is very similar across age groups of nursing home residents (Table 20). Few female nursing home residents with urinary incontinence have indwelling urethral catheters or ostomies (9,495 per 100,000 in 1999) (Table 21); however, fully half require another person's assistance when using the toilet.

Urinary incontinence is regarded as an important risk factor for nursing home admission. Research has indicated that a significant proportion of those admitted to nursing homes are incontinent of urine at the time of their admission (19, 20). After adjustment for age, cohort factors, and comorbid conditions, Thom found that the relative risk of admission to a nursing home is two times greater for incontinent women (21).

The sharp divergence of the NNHS data from published studies on the prevalence of incontinence in nursing homes compels us to pay particular attention to the method of collecting information on incontinence in nursing home residents. According to NNHS data, only 1% to 2% of nursing home patients have an admitting or current diagnosis of urinary incontinence, a finding that highlights the limitations of using administrative data to study the prevalence of incontinence. When queries about bladder function are expanded to include assistance needed from nursing home staff, a high prevalence of bladder dysfunction becomes apparent. Over half of all female nursing home residents are reported to have "difficulty controlling urine," and over half need assistance in using the toilet (Table 22). Thus, when interpreting incontinence prevalence rates, great care must be taken to clarify the definition of incontinence used.

ECONOMIC IMPACT

Medical expenditures for urinary incontinence among female Medicare beneficiaries (65 years of age and older) nearly doubled between 1992 and 1998 from $128.1 million to $234.4 million, primarily due to increased aggregate costs for physician office visits and ambulatory surgery (Table 23). At the same time, inpatient costs increased only modestly between 1992

Table 20. Female nursing home residents with an admitting or current diagnosis of urinary incontinence, count, rate[a] (95% CI)

	1995		1997		1999	
	Count	Rate	Count	Rate	Count	Rate
Total	13,915	1,237 (949–1,524)	20,679	1,789 (1,435–2,143)	15,979	1,366 (1,050–1,681)
Age						
≤74	2,443	1,435 (605–2,265)	2,408	1,334 (610–2,058)	2,627	1,389 (588–2,190)
75–84	4,159	1,131 (662–1,601)	9,029	2,428 (1,679–3,176)	5,668	1,540 (972–2,107)
85+	7,313	1,245 (846–1,644)	9,242	1,531 (1,085–1,978)	7,685	1,254 (823–1,685)
Race						
White	13,397	1,340 (1,022–1,658)	17,962	1,779 (1,403–2,155)	15,075	1,509 (1,148–1,869)
Other	518	421 (0–905)	2,717	1,969 (858–3,080)	904	554 (58–1,051)

[a]Rate per 100,000 nursing home residents in the same demographic stratum.

SOURCE: National Nursing Home Survey, 1995, 1997, 1999.

Table 21. Special needs of female nursing home residents with urinary incontinence, count, rate[a] (95% CI)

	1995		1997		1999	
Category	**Count**	**Rate**	**Count**	**Rate**	**Count**	**Rate**
Has an indwelling foley catheter or ostomy						
Yes	1,435	10,316 (2,864–17,768)	2,423	11,718 (5,311–18,125)	1,517	9,495 (2,892–16,099)
No	12,479	89,684 (82,232–97,136)	18,256	88,282 (81,875–94,689)	14,462	90,505 (83,901–97,108)
Requires assistance using the toilet						
Yes	9,847	70,766 (59,831–81,702)	14,237	68,846 (59,267–78,424)	8,898	55,684 (43,783–67,586)
No	2,475	17,789 (8,437–27,141)	2,794	13,511 (6,777–20,245)	3,234	20,238 (10,842–29,634)
Question skipped for allowed reason	1,592	11,444 (3,978–18,910)	3,405	16,464 (8,416–24,513)	3,847	24,077 (13,340–34,814)
Question left blank	0	0	244	1,179 (0–3,513)	0	0
Requires assistance from equipment when using the toilet						
Yes	3,214	23,095 (12,895–33,295)	4,464	21,587 (13,465–29,709)	2,821	17,653 (9,041–26,266)
No	6,472	46,513 (34,604–58,422)	9,056	43,793 (33,744–53,842)	5,876	36,771 (25,354–48,188)
Question skipped for allowed reason	4,068	29,234 (18,298–40,169)	6,199	29,976 (20,499–39,452)	7,081	44,316 (32,414–56,217)
Question left blank	161	1,159 (0–3,472)	960	4,644 (134–9,154)	201	1,260 (0–3,771)
Requires assistance from another person when using the toilet						
Yes	9,619	69,132 (58,007–80,256)	14,000	67,698 (58,032–77,365)	8,675	54,292 (42,379–66,205)
No	227	1,635 (0–4,884)	0	0	223	1,393 (0–4,164)
Question skipped for allowed reason	4,068	29,234 (18,298–40,169)	6,199	29,976 (20,499–39,452)	7,081	44,316 (32,414–56,217)
Question left blank	0	0	481	2,326 (0–5,563)	0	0
Has difficulty controlling urine						
Yes	10,695	76,859 (66,543–87,176)	15,255	73,772 (64,947–82,597)	13,648	85,412 (77,364–93,460)
No	2,266	16,287 (7,085–25,489)	3,966	19,176 (11,322–27,031)	1,786	11,180 (3,928–18,432)
Question skipped for allowed reason	954	6,854 (895–12,812)	1,458	7,052 (1,886–12,217)	545	3,408 (0–7,333)

[a] Rate per 100,000 adult female nursing home residents with urinary incontinence in the NNHS for that year.

SOURCE: National Nursing Home Survey, 1995, 1997, 1999.

Table 22. Special needs of female nursing home residents regardless of continence status, count, rate[a] (95% CI)

	1995		1997		1999	
Category	**Count**	**Rate**	**Count**	**Rate**	**Count**	**Rate**
Has indwelling foley catheter or ostomy						
Yes	101,827	9,050 (8,281–9,819)	90,855	7,859 (7,151–8,566)	96,151	8,218 (7,484–8,951)
No	1,020,886	90,732 (89,954–91,510)	1,061,282	91,796 (91,072–92,520)	1,064,024	90,937 (90,162–91,712)
Question left blank	2,450	218 (89–347)	3,997	346 (182–510)	9,890	845 (571–1,120)
Requires assistance using the toilet						
Yes	659,035	58,572 (57,256–59,888)	652,615	56,448 (55,131–57,765)	670,006	57,262 (55,935–58,590)
No	286,946	25,503 (24,334–26,671)	280,242	24,240 (23,104–25,375)	273,104	23,341 (22,202–24,480)
Question skipped for allowed reason	173,839	15,450 (14,484–16,417)	216,408	18,718 (17,680–19,756)	218,971	18,714 (17,670–19,759)
Question left blank	5,343	475 (297–652)	6,870	594 (394–794)	7,983	682 (430–935)
Requires assistance from equipment when using the toilet						
Yes	182,812	16,248 (15,274–17,221)	180,518	15,614 (14,659–16,569)	178,305	15,239 (14,293–16,185)
No	460,230	40,903 (39,592–42,215)	433,640	37,508 (36,220–38,795)	467,351	39,942 (38,631–41,254)
Question skipped for allowed reason	460,785	40,953 (39,639–42,267)	496,649	42,958 (41,643–44,272)	492,075	42,055 (40,732–43,379)
Question left blank	21,336	1,896 (1,536–2,257)	45,327	3,921 (3,391–4,450)	32,334	2,763 (2,303–3,224)
Requires assistance from another person when using the toilet						
Yes	652,088	57,955 (56,636–59,274)	640,137	55,369 (54,048–56,689)	661,927	56,572 (55,242–57,901)
No	6,109	543 (345–741)	8,603	744 (511–977)	6,800	581 (384–779)
Question skipped for allowed reason	460,785	40,953 (39,639–42,267)	496,649	42,958 (41,643–44,272)	492,075	42,055 (40,732–43,379)
Question left blank	6,180	549 (357–741)	10,745	929 (681–1,178)	9,263	792 (527–1,056)
Has difficulty controlling urine						
Yes	633,123	56,269 (54,943–57,596)	672,699	58,185 (56,875–59,496)	685,747	58,608 (57,288–59,927)
No	424,287	37,709 (36,411–39,006)	422,839	36,574 (35,293–37,854)	422,162	36,080 (34,793–37,367)
Question skipped for allowed reason	64,822	5,761 (5,124–6,398)	57,080	4,937 (4,370–5,504	55,713	4,761 (4,201–5,322)
Question left blank	2,931	260 (114–407)	3,517	304 (154–454)	6,444	551 (323–778)

[a]Rate per 100,000 adult female nursing home residents in the NNHS for that year.

SOURCE: National Nursing Home Survey, 1995, 1997, 1999.

and 1995, then decreased slightly in 1998 (Figure 7). Table 24 illustrates that, as with Medicare, during the 1990s expenditures in the general population shifted to the outpatient setting. This change in venue probably reflects the general shift of surgical procedures to the outpatient setting, as well as the advent of new procedures, such as periurethral collagen injections, which do not require hospital admission. In addition, the increase in awareness of incontinence and the marketing of new drugs for its treatment may have increased the number of office visits.

While claims-based costs are substantial, others have projected the aggregate cost of UI to be even higher. In one estimation model that included women and men, the aggregate cost of urinary incontinence in the United States in 1995—including diagnostic testing, medical and surgical therapy, medications, routine care, hospitalization, skin irritation, related infections and falls, and other factors—was estimated to be $26.3 billion, almost one-fourth of which was borne by patients themselves as part of routine care (22) (Table 25).

Using diagnostic algorithms, disease prevalence data, reimbursement costs, and sensitivity analyses, Wilson et al. (1) estimated the annual direct cost of urinary incontinence in women to be $12.4 billion in 1995 (Table 26). The largest cost category was routine care, which accounted for 70% of all costs.

In a multivariate analysis controlling for age, gender, work status, median household income, urban vs rural residence, medical and drug plan characteristics, and comorbid conditions, the presence of urinary incontinence was associated with more than twice the annual expenditures per person per

Table 23. Expenditures for female Medicare beneficiaries age 65 and over for treatment of urinary incontinence (in millions of $), (% of total)

	Year		
	1992	1995	1998
Total	128.1	198.7	234.4
Inpatient	90.5 (70.6%)	110.9 (55.8%)	110.1 (47.0%)
Outpatient			
Physician office	25.7 (20.1%)	46.4 (23.4%)	75.9 (32.4%)
Hospital outpatient	2.2 (1.7%)	3.5 (1.8%)	5.0 (2.1%)
Ambulatory surgery	9.3 (7.2%)	36.8 (18.5%)	42.8 (18.2%)
Emergency room	0.4 (0.3%)	1.1 (0.6%)	0.6 (0.2%)

NOTE: Percentages may not add to 100% because of rounding.

SOURCE: Centers for Medicare and Medicaid Services Claims, 1992, 1995, 1998.

Table 24. Expenditures for female urinary incontinence and share of costs, by type of service (in millions of $)

	Year			
	1994	1996	1998	2000
Total[a]	324.6	426.7	485.7	452.8
Share of total				
Inpatient	295.1 (90.9%)	346.0 (81.1%)	357.5 (73.6%)	329.2 (72.7%)
Physician office	29.5 (9.1%)	80.6 (18.9%)	128.2 (26.4%)	123.6 (27.3%)
Hospital outpatient	*	*	*	*
Emergency room	*	*	*	*

*Unweighted counts too low to yield reliable estimates.

[a]Total unadjusted expenditures exclude spending on outpatient prescription drugs for the treatment of urinary incontinence. Average drug spending for incontinence-related conditions (both male and female) is estimated at $82 million to $102 million annually for the period 1996 to 1998.

NOTE: Percentages may not add to 100% because of rounding.

SOURCES: National Ambulatory and Medical Care Survey, National Hospital Ambulatory Medical Care Survey, Healthcare Cost and Utilization Project, Medical Expenditure Panel Survey, 1994, 1996, 1998, 2000.

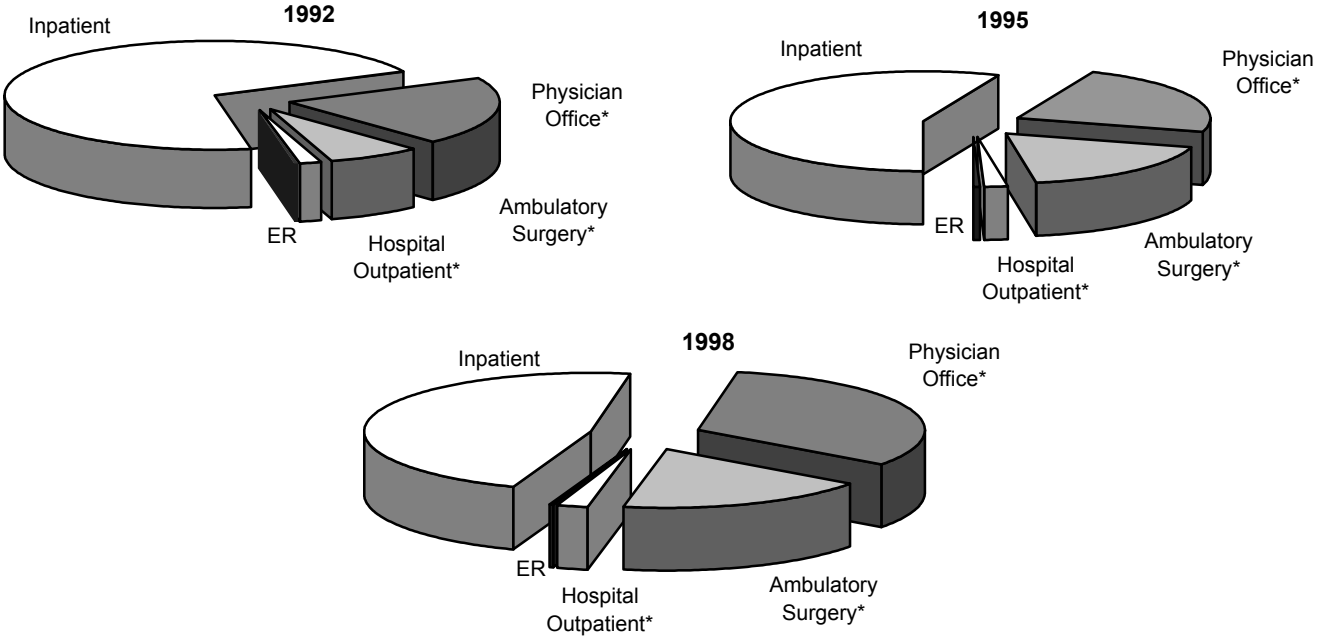

Figure 7. Expenditures for female Medicare benefiiciaries age 65 and over for the treatment of urinary incontinence (in millions of $).
***Constitute outpatient services.**

SOURCE: Centers for Medicare and Medicaid Services, 1992, 1995, 1998.

year compared to those without this condition (Table 27).

The indirect costs for urinary incontinence are estimated by measurements of work lost (Tables 28 and 29). Among all workers with urinary incontinence, 23% of women missed work, while only 8% of men did so. Average annual work absence for women totaled 28.7 hours for both inpatient (7.1 hours) and outpatient (21.6 hours) services. Although women and men had similar numbers of outpatient visits for urinary incontinence, average work loss associated with outpatient care was greater for women (Table 29), probably because of the availability of outpatient procedures for women.

RECOMMENDATIONS

Classification and Coding

Existing databases allow researchers to describe trends in incontinence surgery and hospitalization more accurately than trends in outpatient visits or treatment in nursing homes. Urinary incontinence may be coded as stress incontinence, urge incontinence, mixed incontinence, intrinsic sphincter deficiency, frequency, nocturia, or other terms. Visits during which patients return for follow-up after treatment are also often coded as visits for incontinence, even if the symptom has resolved. While providers can be urged to code more diligently, administrative databases alone will never yield the degree of clinical accuracy needed to create a comprehensive picture of urinary incontinence and its impact on women in the United States. Although hospitalizations are more rigorously coded, there is often a substantial lag between the adoption of new surgical procedures and the establishment of new reimbursement codes, making tracking of trends difficult. Further, surgical codes are often not specific enough for use in health services or clinical research. For example, many types of pubovaginal slings are represented by one code. Despite these limitations, administrative databases do allow investigators to paint broad-brush pictures of the overall picture of urinary incontinence in American women. More specific cohort studies are essential to provide the details.

Table 25. Costs of urinary incontinence in 1995 (in millions of $)

Cost Factor	
Diagnostic costs	
Community[a]	380.7
Institution[b]	12.8
Treatment Costs	
Behavioral	
Community	60.0
Institution	4.0
Pharmacologic	
Community	8.5
Institution	0.8
Surgical	
Community	613.8
Institution	41.2
Routine care costs	
Community	7,146.2
Institution	4,259.7
Incontinence consequences costs	
Skin irritation	
Community	282.8
Institution	136.3
Urinary tract infections	
Community	346.1
Institution	3,835.5
Falls	
Community	56.7
Institution	1.7
Additional admissions to institutions	2,172.1
Longer hospitalization periods	6,229.1
Total direct costs	25,588.0
Indirect costs (value of home care services)	704.4
Total costs of urinary incontinence	26,292.4
Cost per person with urinary incontinence	3,565.1

[a]Non-institutionalized older adults.

[b]Older adults living in an institution.

SOURCE: Reprinted from Urology, 51, Wagner TH, Hu T, Economic costs of urinary incontinence in 1995, 355–361, Copyright 1998, with permission from Elsevier Science.

Future Studies

Given the large number of women affected by urinary incontinence, future studies focusing on both prevention and treatment are vital. Longitudinal studies are needed to delineate the risk factors for urinary incontinence and fistulae in women in different age groups. Such long-term prospective cohort studies, as well as randomized trials, can help determine which factors are amenable to intervention and whether such intervention can change continence status. Well-designed studies are needed to evaluate the effect of child-bearing practices on urinary incontinence and other pelvic floor disorders, particularly in younger women. Many studies of urinary incontinence treatment have very narrow inclusion criteria and do not reflect the general population of incontinent women. More population-based studies are needed. In addition, the inclusion criteria should be broadened in future randomized trials, particularly those of pharmacologic agents, to make the trial results more relevant. Long-term follow-up studies are needed to improve understanding of the longevity of therapeutic effectiveness for incontinence, particularly in patients who have had surgery.

Table 26. Costs of urinary incontinence by age group, residence, and gender[a]

	Elderly[b]		Middle-Age[b]	Younger[b]	
Variable	**Community Dwelling**	**Institutionalized**	**Community Dwelling**		**Total Cost**
Total cost	5,269 (32)	5,500 (34)	2,518 (15)	2,964 (18)	16,252 (100)
Women	3,734 (30)	3,851 (31)	2,245 (18)	2,598 (21)	12,428 (76)
Men	1,535 (40)	1,650 (43)	273 (7)	366 (10)	3,824 (24)
Cost by category[c]					
Routine care	4,174 (79)	2,830 (51)	1,799 (71)	2,533 (85)	11,336 (70)
Women	2,922 (70)	1,981 (70)	1,576 (88)	2,199 (87)	8,678 (77)
Men	1,252 (30)	849 (30)	223 (12)	334 (13)	2,658 (23)
Nursing home admissions	0 (0)	2,410 (44)	0 (0)	0 (0)	2,410 (15)
Women	0 (0)	1,687 (70)	0 (0)	0 (0)	1,687 (70)
Men	0 (0)	723 (30)	0 (0)	0 (0)	723 (30)
Treatment	312 (6)	126 (2)	530 (21)	324 (11)	1,292 (8)
Women	274 (88)	88 (70)	503 (95)	306 (94)	1,171 (91)
Behavioral therapy	8 (3)	88 (100)	4 (1)	6 (2)	106 (9)
Surgery	224 (82)	0 (0)	476 (95)	268 (88)	968 (83)
Pharmacologic therapy	42 (15)	0 (0)	23 (4)	32 (10)	97 (8)
Men	38 (12)	38 (30)	27 (5)	19 (6)	122 (9)
Behavioral therapy	2 (5)	38 (100)	0.4 (1)	0.6 (3)	41 (34)
Surgery	24 (63)	0 (0)	25 (92)	15 (79)	64 (52)
Pharmacologic therapy	12 (32)	0 (0)	2 (7)	3 (16)	17 (14)
Complications	699 (13)	132 (4)	152 (4)	56 (1)	1,039 (7)
Women	479 (69)	93 (70)	134 (89)	49 (88)	755 (73)
Skin irritation	238 (50)	56 (60)	64 (47)	0 (0)	358 (47)
UTI	113 (23)	26 (28)	35 (26)	49 (100)	223 (30)
Falls	128 (27)	11 (12)	34 (25)	0 (0)	173 (23)
Men	220 (31)	39 (30)	19 (11)	7 (13)	285 (27)
Skin irritation	102 (46)	24 (62)	9 (47)	0 (0)	135 (47)
UTI	63 (28)	10 (26)	5 (26)	7 (13)	85 (30)
Falls	55 (25)	5 (13)	5 (26)	0 (0)	65 (23)
Diagnoses and evaluation	84 (2)	3 (0.1)	36 (1)	51 (1)	174 (1)
Women	59 (70)	2 (70)	32 (89)	44 (86)	137 (79)
Men	25 (30)	1 (30)	4 (11)	7 (14)	37 (21)

UTI, urinary tract infection.

[a]Costs presented in millions 1995 US dollars. Percents may not add to 100% because of rounding.

[b]Elderly includes people ≥ 65 years old; middle-age includes people 40-64 years old; younger includes people 15-39 years old.

[b]Results shown in
complication type, and/or treatment type.

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398–406.

Table 27. Estimated annual expenditures of privately insured workers with and without a medical claim for urinary incontinence (UI) in 1999[a] (in $)

	Annual Expenditures (per person)			
	Persons without UI (N=277,803)	Persons with UI (N=1,147)		
	Total	Total	Medical	Rx Drugs
All	3,204	7,702	6,099	1,604
Age				
18–44	2,836	7,361	5,993	1,369
45–54	3,305	8,442	6,695	1,747
55–64	3,288	7,247	5,623	1,623
Gender				
Male	2,813	*	*	*
Female	3,933	*	*	*
Region				
Midwest	3,086	8,500	6,861	1,639
Northeast	3,085	7,236	5,502	1,734
South	3,416	8,329	6,851	1,477
West	3,237	8,082	7,118	964

Rx, prescription.

*Figure does not meet standard for reliability or precision.

[a]The sample consists of primary beneficiaries aged 18 to 64 with employer-provided insurance, who were continuously enrolled in 1999. Estimated annual expenditures were derived from multivariate models that control for age, gender, work status (active/retired), median household income (based on zip code), urban/rural residence, medical and drug plan characteristics (managed care, deductible, co-insurance/co-payments), and 26 disease conditions.

SOURCE: Ingenix, 1999.

Table 28. Average annual work loss of persons treated for urinary incontinence (95% CI)

			Average Work Absence (hrs)		
Gender	Number of Workers[a]	% Missing Work	Inpatient	Outpatient	Total
Male	51	8%	0.0	2.3 (0.0–5.0)	2.3 (0.0–5.0)
Female	319	23%	7.1 (1.7–12.6)	21.6 (11.3–31.9)	28.7 (14.9–42.5)

[a]Individuals with an inpatient or outpatient claim for urinary incontinence and for whom absence data were collected. Work loss is based on reported absences contiguous to the admission and discharge dates of each hospitalization or the date of the outpatient visit.

SOURCE: MarketScan, 1999.

Table 29. Average work loss associated with a hospitalization or an ambulatory care visit for treatment of urinary incontinence (95% CI)

	Inpatient Care		Outpatient Care	
Gender	Number of Hospitalizations[a]	Average Work Absence (hrs)	Number of Outpatient Visits	Average Work Absence (hrs)
Male	*	*	82	1.4 (0.1–2.7)
Female	*	*	625	11.0 (7.5–14.6)

*Figure does not meet standard for reliability or precision.

[a]Unit of observation is an episode of treatment. Work loss is based on reported absences contiguous to the admission and discharge dates of each hospitalization or the date of the outpatient visit.

SOURCE: MarketScan, 1999.

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CHAPTER 4

Urinary Incontinence in Men

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Urinary Incontinence in Men

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SUMMARY

While urinary incontinence (UI) is widely thought of as a condition affecting women, it also affects men of all ages, including 17% of an estimated 3.4 million men over the age of 60 in the United States. The prevalence of UI increases with advancing male age, and rose over time during the 1990s. Ethnicity plays less of a role in UI prevalence estimates for men than it does for women.

Risk factors for UI in both men and women include stroke, dementia, recurrent cystitis, bladder cancer, stool impaction, reduced mobility, diabetes, chronic cough, medications, and aging. However, specific to men is incontinence secondary to benign and malignant prostatic diseases and their treatments. Up to 30% of patients who have had a radical prostatectomy experience some degree of incontinence afterwards.

UI in elderly men creates a substantial burden on health care resources, the largest impact being felt in doctors' offices, followed by outpatient services and surgeries. During the 1990s, rates of physician office visits increased, but the burden of male UI is greatest in nursing homes, where more than half of the male residents report difficulty controlling their urine and require assistance using the toilet, either from equipment (14.8%) or from another person (52%).

The direct economic burden for UI in men is estimated to be $3.8 billion per year (1). The annual medical expenditures of persons with UI are more than twice those of persons without UI, $7,702 vs $3,204. Patients themselves bear a significant proportion of the direct costs of incontinence, including the costs of pads, condom drainage catheters, indwelling foley catheters, and external devices such as Cunningham clamps. Annual costs to all individuals living at home have been estimated to be $7.1 billion (2).

DEFINITION

Urinary incontinence is defined as the complaint of any involuntary leakage of urine (3). It is sometimes grouped with other voiding complaints known collectively as lower urinary tract symptoms (LUTS). LUTS are subjective in nature and hence can be voluntarily self-reported or elicited during a medical history.

Recognized clinical subtypes of UI are defined on the basis of their presumed underlying etiology. An international standard for definitions of incontinence subtypes was set by the International Continence Society (ICS) in 1990 (4) and was updated in 2003 (3).

Stress incontinence is the involuntary leakage of urine on effort or exertion, sneezing, or coughing. *Urge incontinence* is the involuntary leakage of urine accompanied by, or immediately preceded by, urgency. Patients describe this type of incontinence as difficulty in holding their urine until they are able to reach a toilet. *Mixed incontinence* involves components of both stress- and urgency-related leakage. *Continuous incontinence* is constant leakage, usually associated with a fistula; it occurs only rarely in males. *Enuresis* refers to any involuntary loss of urine and should be distinguished from *nocturnal enuresis*, or urinary loss during sleep.

Table 1. Codes used in the diagnosis and management of male urinary incontinence

Males 18 years or older, with any one of the following ICD-9 codes, but not a coexisting 952.xx or 953.xx code:

788.3 Urinary incontinence
788.3 Urinary incontinence unspecified
788.33 Mixed incontinence, male and female
788.34 Incontinence without sensory awareness
788.37 Continuous leakage
599.8 Other specified disorders of urethra and urinary tract
599.81 Urethral hypermobility
599.82 Intrinsic (urethral) sphincter deficiency (ISD)
599.83 Urethral instability
599.84 Other specified disorders of urethra
788.31 Urge incontinence
596.59 Other functional disorder of bladder
596.52 Low bladder compliance
596.51 Hypertonicity of bladder

Post-radical prostatectomy incontinence

Males 18 years or older, with at least one of the above codes and at least one of the following prostatectomy codes:

ICD-9 Procedure Code

60.5

CPT Codes

55840 Prostatectomy, retropubic radical, with or without nerve sparing
55842 Prostatectomy, retropubic radical, with or without nerve sparing
55845 Prostatectomy, retropubic radical, with or without nerve sparing

Spinal cord injury-related incontinence

Males 18 years or older, with a diagnosis code for spinal cord injury 952.xx or 953.xx and at least one of the following ICD-9 codes

344.61 Cauda equina syndrome with neurogenic bladder
596.51 Hypertonicity of bladder (specified as overactive bladder in 2001; included if associated with diagnosis code 952.xx)
596.52 Low compliance bladder
596.54 Neurogenic bladder, NOS
596.55 Detrusor sphincter dyssynergia
596.59 Other functional disorder of bladder
599.8 Other specified disorders of urethra and urinary tract
599.84 Other specified disorders of urethra
625.6 Stress incontinence, female
788.3 Urinary incontinence
788.31 Urge incontinence
788.32 Stress incontinence, male
788.33 Mixed incontinence, male and female
788.34 Incontinence without sensory awareness
788.37 Continuous leakage
788.39 Other urinary incontinence

Some of the 5-digit ICD-9 codes (Table 1) related to incontinence are based on the underlying mechanisms as demonstrated during urodynamic testing. In general, definitions are divided into those seen during filling and those seen during emptying, the two phases of the bladder cycle. Abnormalities during the filling phase include detrusor instability, detrusor hyperreflexia, and abnormalities of bladder compliance. The observation of involuntary detrusor contractions during filling cystometry is called *detrusor instability* in the absence of a neurologic lesion and *detrusor hyperre exia* in the presence of a neurologic lesion. *Detrusor sphincter dyssynergia* (DSD), an abnormality during the emptying phase of the bladder, refers to simultaneous contraction of the detrusor and involuntary contraction of the urethral and/or periurethral striated muscle in a patient with neurologic disease.

Recently, the terminology for urodynamic definitions associated with incontinence was modified to conform to the International Classification of Functioning, Disability and Health (ICFDH-2) and the ICD-10 (5). The terms *detrusor instability* and *detrusor hyperre exia* were replaced. When involuntary detrusor contractions occur during filling cystometry, they are classified as *detrusor overactivity*. If the patient has incontinence at the time of the detrusor overactivity, the term *detrusor overactivity incontinence* is used. If a relevant neurogenic condition is present, the more specific term neurogenic detrusor overactivity is used; otherwise, *idiopathic detrusor overactivity* is used.

CURRENT MEANS OF DIAGNOSIS

Urinary incontinence may be a sign or a symptom. As a symptom, UI may be self-reported or recorded by a third party such as a health care professional or researcher. On rare occasions, patients who report UI as a symptom do not actually have the condition. Perspiration, for example, may mimic UI in men. As such, determining the presence of incontinence by questioning alone is inherently problematical. Because patient reports of severity are subjective, the disorder is difficult to quantify unless specific, standardized questions are posed.

As a clinical sign, UI may be demonstrated during physical examination, cystoscopy, urodynamics, or videourodynamics, or by pad testing. In males, physical examination may reveal clues to the etiology of the underlying condition, but only rarely is the actual sign of incontinence seen. Indirect indicators include soiled clothing, the use of a variety of types of incontinence protection devices, and abnormalities presenting during the neurologic examination, which should include a careful digital rectal examination and assessment of anal sphincter tone. At the time of cystoscopy, abnormalities of the urethral sphincter may be seen in men who have previously undergone prostatectomy, but these abnormalities are not definitive for the diagnosis. Rarely, a urethrocutaneous or rectourethral fistula is observed. Both urodynamics and videourodynamics can provide definitive diagnoses and quantitative measures of the amount of urinary loss under standardized conditions, including volume of urine in the bladder, physical posture, and physical activity. Pad testing is performed by instilling a standardized volume of liquid into the bladder, placing an incontinence pad in the patient's undergarments, and having the patient undergo a standardized sequence of physical activities. The pad is then weighed to quantify the leakage.

A wide range of survey questions can be used to collect data concerning UI. General questions may be as simple as, "Do you have or have you ever had loss of urinary control?" More specific questions are used to elicit the underlying etiology of UI. An affirmative answer to the question, "Do you ever leak or lose urine when you cough, laugh, or sneeze?" may indicate stress incontinence; the answer to, "How often do you have difficulty holding your urine until you can get to a toilet?" may indicate urge incontinence (6).

PREVALENCE

Although the epidemiology of UI has not been investigated in men as thoroughly as in women, most studies show that the male-to-female ratio is about 1: 2. The type, age distribution, and risk factors differ greatly between the genders (7). Estimates of UI prevalence are obtained primarily from responses to survey questions, and the way the questions are worded affects the prevalence estimate (see above). Because UI can be an intermittent condition, the length of time the patient is asked to consider may

alter response rates. For example, "Do you have or have you ever had UI?" may elicit a different response than "Over the last 12 months have you experienced loss of urinary control?" In-person interviews tend to yield higher prevalence rates than do self-reported questionnaires. The prevalence of UI varies by patient age, gender, and language.

When UI prevalence is estimated using ICD-9 codes, several additional issues should be kept in mind. The 5-digit ICD-9 codes used for the National Ambulatory Medical Care Survey (NAMCS), Medstat, Healthcare Care Utilization Project (HCUP), Medicare, and Ingenix datasets may be used to divide incontinence into five groups:

- detrusor instability / overactive bladder / urge incontinence,
- traumatic/iatrogenic incontinence (e.g., following radical prostatectomy),
- spinal-cord-related incontinence,
- nocturnal enuresis, and
- other (fistula, neuropathic bladder, nonorganic causes).

In addition, the following caveats should be noted when considering the data presented in this chapter:

1. There is no specific category for overflow incontinence secondary to outlet obstruction in men, related to prostate or urethral disease. The closest match for this subtype is 788.39 (overflow neurogenic, paradoxical).

2. To identify males with post-radical prostatectomy incontinence, one needs to use codes for incontinence and prostatectomy. In addition, a man may have stress incontinence due to traumatic injury or to prostatectomy for benign prostate disease. There is no specific code for these rare conditions.

3. Urodynamic testing would be required for certain 5-digit codes (e.g., 596.59 for detrusor instability); however, the clinical management of individual patients may not involve urodynamic testing.

4. Because the Medical Expenditure Panel Survey (MEPS) database uses only 3-digit ICD-9 codes, it lacks the specificity necessary to stratify by subtypes of UI.

5. Of all the urological conditions examined in this project, UI is among the least likely to result in a contact with the medical community. While 17% of aged men report some UI, medical care utilization rates are typically less than 1%.

Pooled data from 21 international population-based surveys (Table 2), stratified for age, gender, and frequency of incontinence, indicate that the prevalence of lifetime incontinence among older men is 11% to 34% (median 17%, pooled mean 22%), while the prevalence of daily incontinence is 2% to 11% (median 4%, pooled mean 5%). The prevalence of lifetime incontinence was significantly lower among middle-aged and younger men, ranging from 3% to 5% (median 4%, pooled mean, 5%) (8).

Langa et al. reported a prevalence of 13% in community-dwelling older people (9). These people responded affirmatively when asked, "During the last 12 months, have you lost any amount of urine beyond your control?" This time frame is similar to that in the NHANES question.

As in Thom's study, National Health and Nutrition Examination Survey (NHANES) data suggest that 17% of males older than 60 experience

Table 2. Summary prevalences of urinary incontinence (UI) by age, gender, and frequency

	Ever UI			Daily UI		
	Range	Median	Mean[a]	Range	Median	Mean[a]
Group	%	%	%	%	%	%
Older women	17 to 55	35	34	3 to 17	14	12
Older men	11 to 34	17	22	2 to 11	4	5
Younger women	12 to 42	28	25	no data available		
Younger men	3 to 5	4	5	no data available		

[a]Calculated using numerator and denominator data from each available study.

SOURC

definition, population characteristics, and study type, Journal of American Geriatrics Society, 46, 473-480, Copyright 1998, with permission from the American Geriatrics Society.

Table 3. Prevalence of difficulty controlling bladder among adult men

		Difficulty Controlling Bladder		
	Total	Yes	No	Refused to Answer or Don't Know
All	18,231,934	3,131,814 (17%)	15,054,506 (83%)	45,614 (0%)
Age at screening				
60–64	5,037,678	546,559 (11%)	4,491,119 (89%)	0 (0%)
65–69	4,731,187	518,157 (11%)	4,213,030 (89%)	0 (0%)
70–74	3,320,840	630,898 (19%)	2,675,986 (81%)	13,956 (0%)
75–79	2,748,396	750,478 (27%)	1,988,932 (72%)	8,986 (0%)
80–84	1,478,414	399,774 (27%)	1,078,640 (73%)	0 (0%)
85+	915,419	285,948 (31%)	606,799 (66%)	22,672 (2%)
Race/ethnicity				
Non-Hispanic white	14,790,935	2,395,212 (16%)	12,395,723 (84%)	0 (0%)
Non-Hispanic black	1,436,582	296,022 (21%)	1,122,588 (78%)	17,972 (1%)
Mexican American	559,680	81,134 (14%)	478,546 (86%)	0 (0%)
Other race	429,299	142,015 (33%)	273,598 (64%)	13,686 (3%)
Other Hispanic	1,015,438	217,431 (21%)	784,051 (77%)	13,956 (1%)
Education				
Less than high school	6,072,264	1,214,224 (20%)	4,840,068 (80%)	17,972 (0%)
High school	4,516,092	698,919 (15%)	3,817,173 (85%)	0 (0%)
High school+	7,572,244	1,198,317 (16%)	6,373,927 (84%)	0 (0%)
Refused	25,054	11,368 (45%)	0 (0%)	13,686 (55%)
Don't know	46,280	8,986 (19%)	23,338 (50%)	13,956 (30%)
Poverty income ratio[a]				
Missing	631,305	111,353 (18%)	505,996 (80%)	13,956 (2%)
PIR=0	22,159	12,082 (55%)	10,077 (45%)	0 (0%)
PIR<1	1,806,996	440,261 (24%)	1,366,735 (76%)	0 (0%)
1.00<=PIR<=1.84	3,408,381	653,095 (19%)	2,755,286 (81%)	0 (0%)
PIR>1.84	9,404,848	1,458,110 (16%)	7,946,738 (84%)	0 (0%)
Refused	1,858,169	324,042 (17%)	1,511,455 (81%)	22,672 (1%)
Don't know	1,100,076	132,871 (12%)	958,219 (87%)	8,986 (1%)

[a]See glossary for definition of poverty income ratio.

The data in this table are based on question KIQ.040: "In the past 12 months, have you had difficulty controlling your bladder, including leaking small amounts of urine when you cough or sneeze?"

SOURCE: National Health and Nutrition Examination Survey, 1999–2000.

Table 4. Frequency of bladder control problems among those who responded "yes" to difficulty controlling bladder

	All	Every Day	Few per Week	Few per Month	Few per Year	Don't Know
All	3,131,814	1,307,755 (42%)	747,906 (24%)	577,835 (18%)	459,015 (15%)	39,303 (1%)
Age at screening						
60–64	546,559	187,452 (34%)	204,858 (37%)	48,555 (9%)	105,694 (19%)	0 (0%)
65–69	518,157	172,945 (33%)	153,221 (30%)	104,208 (20%)	87,783 (17%)	0 (0%)
70–74	630,898	299,011 (47%)	111,501 (18%)	118,464 (19%)	100,100 (16%)	1,822 (0%)
75–79	750,478	377,370 (50%)	101,664 (14%)	176,165 (23%)	86,293 (11%)	8,986 (1%)
80–84	399,774	137,186 (34%)	134,527 (34%)	60,591 (15%)	54,106 (14%)	13,364 (3%)
85+	285,948	133,791 (47%)	42,135 (15%)	69,852 (24%)	25,039 (9%)	15,131 (5%)
Race/ethnicity						
Non-Hispanic white	2,395,212	1,039,490 (43%)	505,540 (21%)	418,365 (17%)	403,322 (17%)	28,495 (1%)
Non-Hispanic black	296,022	111,731 (38%)	106,168 (36%)	35,532 (12%)	33,605 (11%)	8,986 (3%)
Mexican American	81,134	47,757 (59%)	17,210 (21%)	6,213 (8%)	8,132 (10%)	1,822 (2%)
Other race	142,015	37,697 (27%)	63,131 (44%)	41,187 (29%)	0 (0%)	0 (0%)
Other Hispanic	217,431	71,080 (33%)	55,857 (26%)	76,538 (35%)	13,956 (6%)	0 (0%)
Education						
Less than high school	1,214,224	423,490 (35%)	386,717 (32%)	244,357 (20%)	157,838 (13%)	1,822 (0%)
High school	698,919	245,562 (35%)	137,414 (20%)	184,242 (26%)	118,337 (17%)	13,364 (2%)
High school+	1,198,317	627,335 (52%)	223,775 (19%)	149,236 (12%)	182,840 (15%)	15,131 (1%)
Refused	11,368	11,368 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Don't know	8,986	0 (0%)	0 (0%)	0 (0%)	0 (0%)	8,986 (100%)
Poverty income ratio[a]						
PIR=0	12,082	0 (0%)	0 (0%)	12,082 (100%)	0 (0%)	0 (0%)
PIR<1	440,261	144,297 (33%)	112,216 (25%)	123,240 (28%)	58,686 (13%)	1,822 (0%)
1.00<=PIR<=1.84	653,095	262,660 (40%)	170,625 (26%)	116,420 (18%)	88,259 (14%)	15,131 (2%)
PIR>1.84	1,458,110	640,720 (44%)	356,276 (24%)	193,356 (13%)	254,394 (17%)	13,364 (1%)
Refused	324,042	156,956 (48%)	47,695 (15%)	72,079 (22%)	47,312 (15%)	0 (0%)
Don't know	132,871	86,722 (65%)	11,890 (9%)	14,909 (11%)	10,364 (8%)	8,986 (7%)
Missing	111,353	16,400 (15%)	49,204 (44%)	45,749 (41%)	0 (0%)	0 (0%)

[a]See glossary for definition of poverty income ratio.

The data in this table are based on question KIQ.06
a month, or a few times a year?"

SOURCE: National Health and Nutrition Examination Survey, 1999–2000.

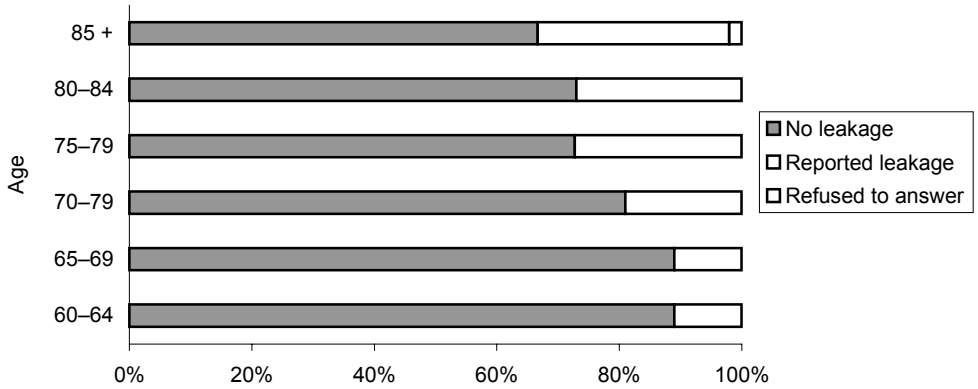

Figure 1a. Difficulty controlling bladder among male responders.

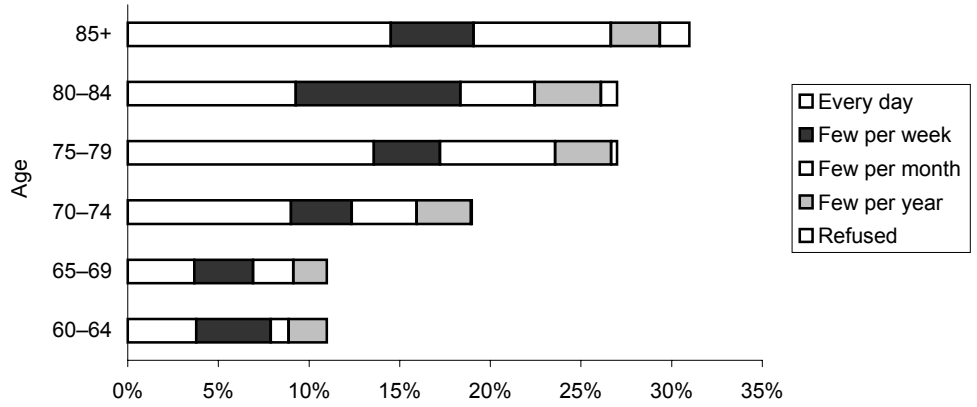

Figure 1b. Frequency of bladder control problems among male responders who answered "yes" to difficulty controlling bladder.

SOURCE: National Health and Nutrition Examination Survey, 1999–2001.

UI (Table 3 and Figure 1a). These men answered affirmatively when asked, "In the past 12 months, have you had difficulty controlling your bladder, including leaking small amounts of urine when you cough or sneeze?" NHANES data indicate a trend of increasing prevalence of UI with increasing age in males. Of the 17% of men reporting UI, 42% indicated that it occurred on a daily basis, while 24% indicated that it occurred weekly (Table 4 and Figure 1b). The 7% prevalence of daily UI in men over 60 (17% of 42%) is similar to the 4% of older men who reported daily episodes in the pooled data reported by Thom (8). The severity of UI based on the frequency of incontinence episodes among younger males is not well documented. The utilization data in this chapter are not entirely consistent with this citation.

Based on a prevalence rate of 17% (Table 3) and data from the 2001 US Census Bureau's intercensal population estimates, it is estimated that almost 3.4 million American men over the age of 60 have UI (US Census).

MORTALITY

In univariate analyses without adjustment for comorbidities or other potential confounding factors, UI is associated with an increased risk of death among elderly men living in both community and nursing home settings (10, 11). The magnitude of increased relative risk of death is variable and is related to the severity of the incontinence and the overall health and functional status of the patient. Applying univariate hazard ratios for mortality in large population studies revealed an increased risk of mortality in the elderly associated with the degree of incontinence: the relative risk of dying is 2.27 for mild UI, 2.96 for

moderate UI, and 5.94 for severe UI, compared with continent controls over a 42-month period (11).

The association observed between UI and death is not likely to be causal because of the impact of advanced age, poor general health, and psychosocial factors. When population studies are subjected to more rigorous multivariate analysis and confounders are taken into consideration, the impact of mild to moderate incontinence on mortality is greatly reduced—in fact, it is statistically insignificant in some studies. However, severe incontinence remains as an independent risk factor for mortality. Specifically, elderly men with incontinence had 50% greater mortality than continent men after adjustment for age alone, but only a 20% greater risk of mortality after additional adjustment for comorbid conditions (12). Therefore, the relationship between mortality and UI is thought to be due in large part to a reduction in general health and increased frailty in the elderly. Daily preventive health measures and the use of routine health screenings are independent predictors of survival in elderly incontinent individuals after age, health status, and psychosocial factors have been controlled for (6).

While epidemiologic studies of mortality in the incontinent have focused on the elderly population, an important consideration is the relative overrepresentation in the younger male population of individuals with neurogenic bladders due to spinal cord injury. The relative risk of mortality in incontinent vs continent younger men is not well documented.

HIGH-RISK GROUPS AND RISK FACTORS

Continence in males results from a combination of factors, including appropriate function of the bladder and sphincter mechanisms. Since the function of these anatomic structures is neurologically regulated, diseases that affect the central or peripheral nervous systems may increase the risk of UI. Environmental factors, cognitive status, mobility, medications and social habits can also influence continence status. Risk factors for UI can be categorized as physical attributes, pharmaceutical agents, social habits, and reversible factors.

As noted above, the prevalence of UI increases with *increasing age*, particularly in those over 65.

Risk Factors for Urinary Incontinence in Men	
Physical Attributes	**Pharmaceutical Agents**
Age	Benzodiazepines
Obesity	Antidepressants
Race	Antipsychotics
Immobility	Diuretics
Previous transurethral surgery	Antiparkinsonian medications
Previous radical prostatectomy	Narcotic analgesics
	Alpha antagonists
Neurologic disease (e.g., stroke)	Alpha agonists
	Calcium channel blockers
Spinal cord injury	ACE inhibitors
Cognitive impairment	Antianxiety/hypnotics
Social Habits	**Reversible Factors**
Smoking	Urinary tract infection
Alcohol	Pharmaceuticals
Caffeine	Psychological
	Exessive urine production (polyuria or nocturia)
	Stool impaction

Age-related physical changes within the detrusor itself include more unstable bladder contractions, more residual urine, and less bladder contractility (13). Overall, the multifactorial elements of aging, including modified pharmacokinetics and associated physical comorbidities, may convert a continent patient to an incontinent one. For example, as men age, the prostate gland enlarges due to benign or malignant disease. Additional physical attributes such as age, mobility, previous prostatic surgery, neurologic disease, spinal cord injury, and delirium may also contribute to loss of continence. Obesity and race are cited as risk factors for UI in women, but data on these factors specific to men are lacking.

A history of prostate cancer treatment, including radiation or radical prostatectomy, is known to confer an increased risk of incontinence, as has been reported by many researchers since the mid-1990s. Radical prostatectomy involves extensive dissection near the bladder neck and external sphincter, both of which contribute to continence in men. Prostate

radiation (external beam or brachytherapy) may affect the same structures and may also cause damage to the bladder itself, leading to incontinence from an overactive detrusor.

Restricted mobility (due, e.g., to bedrails, trunk restraints, or chair restraints) limits access to toilet facilities and hence increases the risk of UI (14).

Because the central nervous system has both excitatory and inhibitory effects on the bladder, a variety of central neurological diseases can cause incontinence. Most notably, stroke confers an increased risk of UI. In one large population-based study, nearly 50% of stroke patients had UI. This proportion falls to about 20% in patients surviving for at least six months after a stroke (15).

While somewhat controversial, alcohol and caffeine intake have been implicated as risk factors for UI, although almost no data on male subjects are available.

Because elderly patients have altered pharmacodynamics and pharmacokinetics, certain drugs that affect cognition may impact bladder function primarily or may lead to increased urine output, thus contributing to the risk of UI (14). For example, benzodiazepine use has been reported to increase the risk of UI by 45% (OR, 1.44; 95% CI, 1.12–1.83) (16). Selective serotonin reuptake inhibitors have been similarly implicated (17).

NATURAL HISTORY

Cross-sectional studies have found that the prevalence of UI in men increases with age in a roughly linear fashion. Most studies have found a predominance of urge incontinence (40%–80%), followed by mixed incontinence (10%–30%) and stress incontinence (<10%). Stress incontinence becomes more common as men age, probably as a result of surgery for prostate enlargement and prostate cancer. For example, up to 34% of men report persistent UI following a radical prostatectomy (18).

Relatively little information is available on the incidence of UI in men, but what there is suggests that it is a surprisingly dynamic condition. One population-based study of men and women 60 and older found the one-year incidence of new UI in men (most of which was classified as mild) to be 10%, (19). The annual rate of remission was about 30%. These figures probably reflect the important role of reversible causes of male UI, including benign prostatic hyperplasia, urinary tract infections, and constipation.

TRENDS IN HEALTH CARE RESOURCE UTILIZATION

Inpatient Care

Table 5 shows rates of inpatient hospitalizations among men having UI as the primary diagnosis. Data from the HCUP inpatient sample indicate that the overall rate was steady at 1.4 to 2.1 per 100,000,

Table 5. Inpatient hospital stays by males with urinary incontinence listed as primary diagnosis, count, rate[a] (95% CI)

	1994		1996		1998		2000	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate
Total	1,431	2.1 (1.4–1.9)	1,529	1.7 (1.4–2.0)	1,490	1.6 (1.4–1.8)	1,332	1.4 (1.2–1.6)
Region								
Midwest	397	2.1 (1.4–2.4)	285	1.3 (0.6–2.0)	435	2.0 (1.4–2.6)	334	1.5 (1.0–1.9)
Northeast	338	2.1 (1.3–2.5)	366	2.0 (1.4–2.6)	304	1.7 (1.2–2.2)	324	1.8 (1.2–2.4)
South	393	1.1 (0.9–1.7)	640	2.0 (1.4–2.6)	527	1.6 (1.2–1.9)	459	1.4 (1.0–1.7)
West	302	2.1 (0.8–2.3)	238	1.2 (0.8–1.6)	225	1.1 (0.8–1.4)	215	1.0 (0.6–1.4)

[a]Ra
Research Corporation, for relevant demographic categories of US male civilian non-institutionalized population.
NOTE: Counts may not sum to totals due to rounding.
SOURCE: Healthcare Cost and Utilization Project Nationwide Inpatient Sample, 1994, 1996, 1998, 2000.

Table 6. Inpatient stays by male Medicare beneficiaries with urinary incontinence listed as primary diagnosis, count[a], rate[b] (95% CI)

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total all ages[c]	1,520	10 (9.8–11)	1,680	11 (11–12)	1,620	11 (11–12)
Total < 65	60	1.9 (1.5–2.4)	160	4.6 (3.9–5.4)	140	4.1 (3.4–4.7)
Total 65+	1,460	13 (12–13)	1,520	13 (12–14)	1,480	13 (13–14)
Age						
65–74	700	9.7 (9.0–10)	640	8.9 (8.2–9.6)	620	9.6 (8.9–10)
75–84	580	16 (15–18)	640	17 (16–19)	760	21 (19–22)
85–94	160	20 (17–23)	200	24 (20–27)	100	12 (9.2–14)
95+	20	26 (14–37)	40	49 (34–63)	0	0.0
Race/ethnicity						
White	1,320	11 (10–11)	1,480	11 (11–12)	1,440	12 (11–12)
Black	120	9.4 (7.8–11)	80	5.8 (4.5–7.1)	120	9.0 (7.4–11)
Asian	…	…	0	0.0	0	0.0
Hispanic	…	…	60	30 (23–38)	40	12 (8.3–16)
N. American Native	…	…	0	0.0	0	0.0
Region						
Midwest	420	11 (10–12)	620	16 (15–17)	660	18 (16–19)
Northeast	320	10 (9.0–11)	120	3.8 (3.1–4.4)	280	10 (8.9–11)
South	420	8.0 (7.3–8.8)	700	13 (12–14)	500	9.3 (8.5–10)
West	340	15 (14–17)	200	8.6 (7.4–9.8)	160	7.2 (6.0–8.3)

… data not available.

[a]Unweighted counts multiplied by 20 to arrive at values in the table.

[b]Rate per 100,000 Medicare beneficiaries in the same demographic stratum.

[c]Persons of other race, unknown race and ethnicity, and other region are included in the totals.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, MedPAR and 5% Carrier File, 1992, 1995, 1998.

with no meaningful change from 1994 through 2000. The rate remained low across all geographic regions. This is consistent with clinical experience that UI does not typically lead to hospital admission, except for surgical correction of the condition. Estimates of inpatient hospitalizations through the 1990s in the Medicare (CMS) population are presented in Table 6. The overall rate of inpatient hospital stays for men ≥65 years of age with UI was stable at 13 per 100,000 male Medicare beneficiaries. The rate for men <65 years of age in the Medicare population fluctuated more, probably as a result of peculiarities of data on the disabled population. Caucasian males had higher inpatient hospitalization rates than did African American males. Asian and Hispanic men were not identified as specific populations until 1995, and their relatively low counts make interpretation of the corresponding rates difficult.

Consistent with larger secular trends, lengths of stay (LOS) of men with UI as a primary diagnosis decreased between 1994 and 2000 (Table 7). Sample sizes for the non-whites and those younger than 55 were too small to produce reliable estimates for those demographic categories. LOS declined across all regions from 1994 to 1996, the shortest mean LOS being 2.0 days in the West. Increasing market pressure from managed care during that time may have contributed to this trend. There was wide variation in inpatient LOS for men with UI in rural areas. In 1994, mean LOS in rural hospitals (3.8 days) was similar to that in urban hospitals; in 1996, it increased to 4.2 days, then it declined to 2.3 days in 1998; it then increased to a high of 4.3 days in 2000, 1.3 days longer than for urban sites. In urban hospitals, there was a general downward trend in LOS, to 3.0 days in 2000. The diffusion of managed care from urban to rural areas through the 1990s may explain these observations.

Table 7. Trends in mean inpatient length of stay (days) for adult males hospitalized with urinary incontinence listed as primary diagnosis

	Length of Stay			
	1994	1996	1998	2000
All	3.7	2.8	3.0	3.2
Age				
18–24	*	*	*	*
25–34	*	*	*	*
35–44	*	*	*	*
45–54	*	*	*	*
55–64	2.8	2.1	3.0	2.8
65–74	3.3	2.3	2.0	2.9
75–84	4.3	3.6	3.4	3.2
85+	*	*	*	*
Race/ethnicity				
White	3.9	2.9	3.2	3.1
Black	*	*	*	*
Hispanic	*	*	*	*
Asian/Pacific Islander	*	*	*	*
Other	*	*	*	…
Region				
Midwest	3.2	2.2	3.1	3.3
Northeast	5.1	2.8	4.0	2.5
South	3.8	3.5	2.6	2.9
West	2.7	2.0	2.5	4.5
MSA				
Rural	3.8	4.2	2.3	4.3
Urban	3.7	2.7	3.2	3.0
Discharge status				
Routine	3.0	2.5	2.5	2.6
Skilled nursing facility	*	*	…	…
Intermediate care	*	*	…	…
Other facility	*	*	6.2	*
Home health	*	*	*	*
Against medical advice	*	*	*	*
Died	*	*	*	*

… data not available.

*Figure does not meet standard for reliability or precision.

MSA, metropolitan statistical area.

SOURCE: Healthcare Cost and Utilization Project Nationwide Inpatient Sample, 1994, 1996, 1998, 2000.

Outpatient Care

According to data from the National Hospital Ambulatory Medical Care Survey (NHAMCS) for 1994, 1996, 1998, and 2000 (Table 8), 0.1% of all hospital outpatient visits by men over the age of 18 were associated with UI as any listed diagnosis. Because the counts for this diagnosis were so low, the 1994, 1996, 1998, and 2000 data were collapsed to yield a rate of 90 per 100,000 for the four years combined (or 22.5 per 100,000 annually). Hospital outpatient visit rates for men with UI listed as the primary diagnosis were about 10 per 100,000 annually.

As expected, the rate of outpatient visits for men with UI (Table 9) is far greater than that for inpatient visits by men (Table 6) both under and over age 65. The rates increased for men in all groups from 1992 to 1998. Outpatient visits by men over age 65 with UI were 2.8 times more frequent than inpatient visits (hospitalizations) in 1992 and were 5.2 times more frequent by 1998. Men 75 to 84 years of age had the highest outpatient visit rates, 59 per 100,000 in 1992 and 85 per 100,000 in 1995. The difference in Medicare outpatient vs inpatient services for men with UI under age 65 is even more striking. Outpatient visits were 10 times more frequent than inpatient visits in 1992 and 11.4 times more frequent in 1998. Regional Medicare data indicate that outpatient visit rates in 1992 ranged from 2.9 to 4.4 times the rate of inpatient visits. By 1998, outpatient visit rates were 4.1 to 9.6 times higher than inpatient visit rates for all regions. In 1998 (the most recent year for which data are available), the South had the lowest rate of inpatient visits, 42 per 100,000. In the Midwest, both outpatient and inpatient visit rates increased to a high of 98 per 100,000 in 1998, more than double the rate in the South.

Interestingly, there was an inverse relationship between the rate of outpatient and inpatient services for African American males and that for Caucasian males. From 1992 to 1998, rates of inpatient visits were consistently higher for Caucasians, while rates of outpatient services were consistently higher for African Americans. The difference was greatest in 1995, when the ratio of outpatient visits for African American males was 2.4 times that for Caucasian males, narrowing to 1.5 in 1998. As with inpatient visits, Hispanic men had a markedly higher rate of outpatient visits—179 per 100,000 in 1998, twice

Table 8. National hospital outpatient visits by adult males with urinary incontinence, count (95% CI), number of visits, percentage of visits, rate (95% CI)

	4-Year Count (95% CI)	Total No. Visits by Men 18+, 1994–2000	% of Visits	4-Year Rate (95% CI)
Primary diagnosis	38,629 (3,361–73,897)	78,399,663	0.0	42 (4–80)
Any diagnosis	83,762 (29,850–137,674)	78,399,663	0.1	90 (32–149)

[a]Rate
four years.
categories of US male adult civilian non-institutionalized population.
SOURCE: National Hospital Ambulatory Medical Care Survey, 1994, 1996, 1998, 2000.

Table 9. Outpatient hospital visits by male Medicare beneficiaries with urinary incontinence listed as primary diagnosis, count[a], rate[b] (95% CI)

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total all ages[c]	5,080	34 (34–35)	8,300	55 (53–56)	9,420	65 (64–66)
Total < 65	900	29 (27–31)	1,620	47 (45–49)	2,040	59 (57–62)
Total 65+	4,180	36 (35–37)	6,680	57 (55–58)	7,380	67 (65–68)
Age						
65–74	1,840	25 (24–27)	2,900	40 (39–42)	2,960	46 (44–48)
75–84	2,080	59 (56–61)	3,120	85 (82–88)	3,080	84 (81–87)
85–94	240	30 (27–34)	620	73 (67–79)	1,300	150 (142–158)
95+	20	26 (14–37)	40	49 (34–63)	40	46 (32–59)
Race/ethnicity						
White	3,840	31 (30–32)	6,200	48 (47–49)	7,320	60 (58–61)
Black	900	71 (66–75)	1,580	114 (108–120)	1,160	87 (82–92)
Asian	…	…	20	27 (15–40)	100	73 (58–88)
Hispanic	…	…	240	121 (106–136)	600	179 (164–193)
N. American Native	…	…	40	199 (139–258)	0	0.0
Region						
Midwest	1,780	48 (46–50)	2,280	59 (57–62)	3,620	98 (95–101)
Northeast	1,260	40 (38–42)	1,880	59 (56–62)	1,920	69 (66–72)
South	1,060	20 (19–21)	2,260	41 (40–43)	2,280	42 (41–44)
West	980	44 (41–46)	1,880	81 (77–85)	1,580	71 (67–74)

… data not available.
[a]Unweighted counts multiplied by 20 to arrive at values in the table.
[b]Rate per 100,000 Medicare beneficiaries in the same demographic stratum.
[c]Persons of other races, unknown race and ethnicity, and other region are included in the totals.
NOTE: Counts less than 600 should be interpreted with caution.
SOURCE: Centers for Medicare and Medicaid Services, MedPAR and 5% Carrier File, 1992, 1995, 1998.

that of African Americans and three times that of Caucasians. These differences may follow from differences in the types of services provided. Surgical therapy for UI in the 1990s was typically provided on an inpatient basis, while nonsurgical therapy was provided on an outpatient basis. Further study is needed to clarify these trends.

Veterans Health Administration (VA) data, which are based on outpatient medical records rather than population survey data, show a strong trend toward increasing prevalence of medically recognized UI with increasing age in males; the prevalence in men 85 years of age and older is approximately ten times that in men 35 to 44 years of age. Table 10 also demonstrates an increase over time in the prevalence of medically recognized UI in men, from 717 per 100,000 in 1999 to 975 per 100,000 in 2001 (all diagnoses of UI). As expected, the prevalence of medically recognized UI based on ICD-9 codes from office visits is substantially less than that found in the NHANES study, which is population-based. The increase in medically recognized UI between 1999 and 2001 likely reflects an increase in clinical ascertainment of UI, rather than an increase in underlying prevalence. Racial/ethnic differences in prevalence among men are modest compared to the differences among women, although African American men consistently have a slightly higher prevalence than do Caucasians. Racial differences in care-seeking behavior and perceptions of the health care system make these data difficult to interpret. Regional differences are slight and vary from year to year without a consistent pattern.

According to Medicare data (Table 11), the rates of physician office visits for male UI increased by 77% between 1992 and 1998, from 395 per 100,000 to 698 per 100,00, for all age groups. Visit rates for men 65 years of age and older increased from 457 per 100,000 to 818 per 100,000, and rates for those under 65 increased from 164 per 100,000 to 314 per 100,000. More detailed examination reveals that there is a trend of increasing rates of physician office visits for each age category in the 65 and older group up to and including the 85 to 94 age group, which had a rate of 1,721 per 100,000 in 1998 (Table 11 and Figure 2). Regionally, physician office visit rates varied less than hospitalization rates, which ranged widely from year to year, even within individual geographic areas. The trend to increasing physician visits was consistent across all geographic regions. In 1998, the highest rate occurred in the West, 746 per 100,000, but this was only 10% higher than the lowest rate, seen in the Midwest. In 1998, the highest utilization of physician office services was for Caucasian males, followed by Asians, Hispanics, and African Americans. According to data from NAMCS for 1992–2000, 0.1% of all office

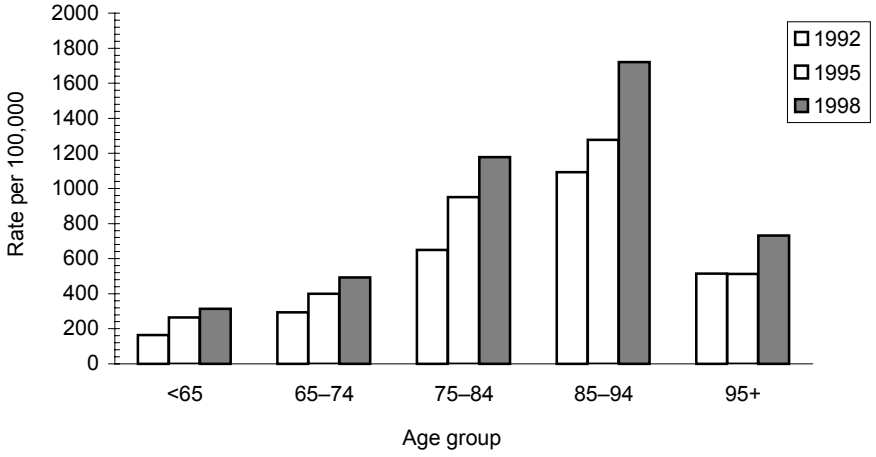

Figure 2. Physician office visits by male Medicare beneficiaries for urinary incontinence, by patient age and year.

SOURCE: Centers for Medicaid and Medicare Serivces, MedPAR, and 5% Carrier File, 1992, 1995, 1998.

Table 10. Frequency of urinary incontinence[a] in male VA patients seeking outpatient care, rate[b]

	1999		2000		2001	
	Primary Diagnosis	Any Diagnosis	Primary Diagnosis	Any Diagnosis	Primary Diagnosis	Any Diagnosis
Total	437	717	525	914	515	975
Age						
18–24	62	77	79	113	87	99
25–34	103	146	117	169	133	178
35–44	148	216	183	275	196	290
45–54	228	336	273	411	280	444
55–64	363	570	416	677	422	707
65–74	538	886	596	1,058	558	1,076
75–84	812	1,400	950	1,748	836	1,723
85+	1,227	2,243	1,489	2,792	1,365	2,908
Race/ethnicity						
White	597	963	696	1,197	688	1,264
Black	691	1,068	833	1,296	876	1,382
Hispanic	492	891	678	1,075	571	1,004
Other	549	899	634	1,129	536	894
Unknown	177	319	237	479	251	586
Region						
Midwest	398	693	484	928	459	937
Northeast	557	874	628	1,006	563	998
South	343	591	450	806	480	930
West	494	767	578	973	584	1,075
Insurance status						
No insurance/self-pay	344	541	408	660	394	690
Medicare/Medicare supplemental	679	1162	768	1,449	726	1,482
Medicaid	538	926	671	1,128	581	1,019
Private insurance/HMO/PPO	432	722	491	828	467	853
Other insurance	322	574	401	699	388	680
Unknown	1,244	2,035	1,076	1,937	416	648

HMO, health maintenance organization; PPO, preferred provider organization.

[a]Represents diagnosis codes for male urinary incontinence.

[b]Rate is defined as the number of unique patients with each condition divided by the base population in the same fiscal year x 100,000 to calculate the rate per 100,000 unique outpatients.

NOTE: Race/ethnicity data from clinical observation only, not self-report; note large number of unknown values.

SOURCE: Outpatient Clinic File (OPC), VA Austin Automation Center, FY1999–FY2001.

Table 11. Physician office visits by male Medicare beneficiaries with urinary incontinence listed as primary diagnosis, count[a], rate[b] (95% CI)

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total all ages[c]	58,240	395 (392–399)	83,800	551 (547–554)	101,080	698 (694–702)
Total < 65	5,080	164 (160–169)	9,080	264 (258–269)	10,780	314 (308–320)
Total 65+	53,160	457 (453–461)	74,720	635 (630–639)	90,300	818 (812–823)
Age						
65–74	21,200	293 (289–297)	28,720	400 (395–404)	31,600	492 (486–497)
75–84	22,920	649 (641–657)	34,740	950 (940–960)	43,160	1,179 (1,168–1,190)
85–94	8,640	1,093 (1,070–1,116)	10,840	1,278 (1,254–1,302)	14,900	1,721 (1,694–1,748)
95+	400	515 (465–565)	420	512 (463–561)	640	732 (676–788)
Race/ethnicity						
White	50,280	405 (402–409)	74,320	572 (568–576)	88,900	727 (722–732)
Black	4,120	323 (313–333)	6,380	461 (449–472)	7,020	526 (514–538)
Asian	…	…	740	1,015 (943–1,088)	940	685 (642–729)
Hispanic	…	…	940	473 (443–504)	2,260	673 (646–701)
N. American Native	…	…	20	99 (55–144)	40	143 (100–186)
Region						
Midwest	15,480	417 (411–424)	20,540	533 (526–540)	23,880	646 (638–654)
Northeast	11,840	373 (367–380)	17,880	562 (554–570)	19,660	707 (698–717)
South	21,180	404 (399–410)	30,440	555 (549–561)	39,760	741 (734–748)
West	8,900	396 (388–404)	13,900	599 (589–609)	16,680	746 (735–757)

… data not available.

[a]Unweighted counts multiplied by 20 to arrive at values in the table.

[b]Rate per 100,000 Medicare beneficiaries in the same demographic stratum.

[c]Persons of other races, unknown race and ethnicity, and other region are included in the totals.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, MedPAR and 5% Carrier File, 1992, 1995, 1998.

Table 12. National physician office visits by adult males with urinary incontinence, count (95% CI), number of visits, percentage of visits, rate (95% CI)

	5-Year Count (95% CI)	Total No. Visits by Men 18+, 1992–2000	% of Visits	5-Year Rate (95% CI)
Primary diagnosis	989,688 (665,142–1,314,234)	1,122,162,099	0.1	1,079 (725–1,433)
Any diagnosis	1,660,627 (1,245,549–2,075,705)	1,122,162,099	0.1	1,811 (1,358–2,263)

[a]Rate per 100,000 based on the sum of weighted counts in 1992, 1994, 1996, 1998, 2000 over the mean estimated base population across those five years. Population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation, for relevant demographic categories of US male adult civilian non-institutionalized population.

SOURCE: National Ambulatory Medical Care Survey, 1992, 1994, 1996, 1998, 2000.

Table 13. Visits to ambulatory surgery centers by male Medicare beneficiaries with urinary incontinence listed as primary diagnosis, count[a], rate[b] (95% CI)

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total all ages[c]	3,140	21 (21–22)	7,340	48 (47–49)	5,480	38 (37–39)
Total < 65	340	11 (9.8–12)	680	20 (18–21)	600	17 (16–19)
Total 65+	2,800	24 (23–25)	6,660	57 (55–58)	4,880	44 (43–45)
Age						
65–74	1,320	18 (17–19)	3,680	51 (50–53)	2,460	38 (37–40)
75–84	1,040	29 (28–31)	2,460	67 (65–70)	1,980	54 (52–56)
85–94	440	56 (50–61)	500	59 (54–64)	420	49 (44–53)
95+	0	0.0	20	24 (13–35)	20	23 (13–33)
Race/ethnicity						
White	2,700	22 (21–23)	6,800	52 (51–54)	4,820	39 (38–41)
Black	200	16 (13–18)	320	23 (21–26)	480	36 (33–39)
Asian	…	…	0	0.0	60	44 (33–55)
Hispanic	…	…	40	20 (14–26)	20	6.0 (3.3–8.6)
N. American Native	…	…	0	0.0	0	0.0
Region						
Midwest	1,280	35 (33–36)	2,200	57 (55–59)	1,720	47 (44–49)
Northeast	640	20 (19–22)	1,700	53 (51–56)	1,140	41 (39–43)
South	960	18 (17–19)	2,880	52 (51–54)	1,860	35 (33–36)
West	260	12 (10–13)	560	24 (22–26)	740	33 (31–35)

… data not available.

[a]Unweighted counts multiplied by 20 to arrive at values in the table.

[b]Rate per 100,000 Medicare beneficiaries in the same demographic stratum.

[c]Persons of other races, unknown race and ethnicity, and other region are included in the totals.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, MedPAR and 5% Carrier File, 1992, 1995, 1998.

visits to physician offices by males were for UI as the primary diagnosis (Table 12). Because the counts were so low for this diagnosis, the five even years between 1992 and 2000 were collapsed to yield a physician rate of 1,079 per 100,000 for the five years combined (or 216 per 100,000 annually). When the scope of the definition was broadened to include UI as any diagnosis, the proportion remained unchanged, but the visit rate increased to 1,811 per 100,000 for the five years combined (or 362 per 100,000 annually).

Ambulatory surgery visits for men with UI (Table 13) were far less frequent than were physician office visits (Table 11). For men under 65, the rate increased between 1992 and 1995, then decreased to the 1998 level of 17 per 100,000. Likewise, the rate for men over 65 increased between 1992 and 1995, then fell slightly to the 1998 level of 44 per 100,000. This pattern of increasing rates followed by a slight decline was seen across all age groups for men 65 and over.

The pattern of change in rates of ambulatory surgery visits for regions mirrors the trend for age. That is, rates increased across all geographic regions between 1992 and 1995, then decreased for 1998, where the lowest rate, 33 per 100,00, was seen in the West.

It was not possible to calculate trends in outpatient UI surgery visit rates among ethnic groups because counts were too small to produce reliable estimates. The exception was the rate for Caucasian males, who showed an increase in outpatient surgical visits in 1995, with a subsequent reduction in 1998.

Nursing Home Care

Data from the National Nursing Home Survey (NNHS) for 1995, 1997, and 1999 are shown in Table

Table 14. Special needs of male nursing home residents regardless of continence status, count, rate[a] (95% CI)

	1995		1997		1999	
	Count	Rate	Count	Rate	Count	Rate
Has indwelling foley catheter or ostomy						
Yes	50,298	11,961 (10,569–13,352)	53,938	12,141 (10,731–13,552)	51,457	11,266 (9,941–12,591)
No	369,452	87,854 (86,453–89,254)	389,880	87,762 (86,348–89,176)	401,402	87,884 (86,497–89,271)
Question left blank	781	186 (3–368)	430	97 (0–210)	3,883	850 (385–1,315)
Requires assistance using the toilet						
Yes	207,587	49,363 (47,203–51,523)	221,599	49,882 (47,736–52,028)	241,558	52,887 (50,755–55,020)
No	141,870	33,736 (31,689–35,783)	133,378	30,023 (28,069–31,977)	128,251	28,080 (26,154–30,005)
Question skipped for allowed reason	69,267	16,471 (14,863–18,080)	86,814	19,542 (17,809–21,275)	81,977	17,948 (16,308–19,588)
Question left blank	1,807	430 (146–714)	2,459	553 (238–869)	4,956	1,085 (571–1,599)
Requires assistance from equipment when using the toilet						
Yes	57,463	13,664 (12,183–15,145)	59,329	13,355 (11,901–14,809)	67,782	14,840 (13,323–16,357)
No	143,213	34,055 (32,011–36,100)	149,218	33,589 (31,564–35,614)	162,895	35,665 (33,630–37,699)
Question skipped for allowed reason	211,137	50,207 (48,047–52,368)	220,191	49,565 (47,419–51,711)	210,228	46,028 (43,899–48,156)
Question left blank	8,719	2,073 (1,466–2,680)	15,510	3,491 (2,702–4,281)	15,837	3,467 (2,650–4,285)
Requires assistance from another person when using the toilet						
Yes	203,490	48,389 (46,230–50,548)	217,556	48,972 (46,827–51,117)	238,252	52,163 (50,029–54,297)
No	2,350	559 (237–881)	2,571	579 (234–924)	2,690	589 (237–941)
Question skipped for allowed reason	211,137	50,207 (48,047–52,368)	220,191	49,565 (47,419–51,711)	210,228	46,028 (43,899–48,156)
Question left blank	3,554	845 (451–1,239)	3,930	885 (482–1,287)	5,573	1,220 (681–1,759)
Has difficulty controlling urine						
Yes	218,491	51,956 (49,797–54,115)	232,536	52,344 (50,203–54,485)	242,189	53,025 (50,898–55,153)
No	170,988	40,660 (38,537–42,783)	175,090	39,413 (37,325–41,500)	177,128	38,781 (36,709–40,852)
Question skipped for allowed reason	29,338	6,976 (5,881–8,072)	36,416	8,197 (7,028–9,366)	34,206	7,489 (6,406–8,572)
Question left blank	1,715	408 (110–705)	207	47 (0–138)	3,220	705 (255–1,155)

[a]Rate per 100,000 adult male nursing home residents in the NNHS for that year.

SOURCE: National Nursing Home Survey, 1995, 1997, 1999.

14. The burden of UI in the nursing home setting is clear when activities of daily living are considered. In 1999, more than half of the men in nursing homes were reported to have difficulty controlling their urine and required assistance using the toilet; 14.8% required assistance from equipment and 52% required assistance from another person. Eleven percent had either an indwelling foley or an ostomy. There was little change in these parameters over the years studied. In fact, from 1997 to 1999, there was a small increase in the rate of patients requiring assistance from another person to use the toilet.

TREATMENTS

In general, treatment options for incontinence are based on the type of incontinence rather than the gender of the patient. For this reason, many studies and reviews include case mixes of men and women (20). The exceptions are in the management of issues related to the prostate gland (e.g., post-radical prostatectomy) and male neurogenic bladder, where treatment addresses the male sphincter. In these areas, where large groups of men have been studied, gender-specific treatment effects are apparent.

Nonpharmaceutical / Nonsurgical

Behavioral therapies, including pelvic floor muscle (PFM) exercises, biofeedback, and bladder training, are the least invasive options and have a low rate of side effects. They may be used both for cognitively impaired/institutionalized patients and for independently living, cognitively aware geriatric patients able to participate in learning new skills. There is a considerable body of scientific evidence supporting the effectiveness of behavioral therapy, but most subjects in those reports are women. Most of the research on conservative treatment of UI in men focuses on post-prostatectomy incontinence.

A recent review of the Cochrane database found only 6 randomized controlled trials of conservative approaches to management of post-prostatectomy incontinence. Studies were moderate in quality, and the authors concluded, "Men's symptoms tend to improve over time, irrespective of management. The value of the various approaches to conservative management of post-prostatectomy incontinence remains uncertain" (21).

PFM exercises, often attributed to Dr Kegel, refer primarily to pelvic muscle training as a means of reducing stress incontinence in women (22). In a randomized controlled trial of PFM exercises in 58 consecutive post-prostatectomy patients with a four-week follow-up, Porru et al. (23) reported more rapid resolution of UI symptoms and significantly better quality of life in the treatment group. A Cochrane review of PFM exercises reported no difference in the occurrence of post-operative UI between patients who had pre-prostate-surgery PFM training and the control group (24, 25). There are no randomized controlled trials in the literature concerning PFM exercises for non-post-operative men (26).

Biofeedback affords patients immediate observed information on performance of muscle contraction, allowing them to adjust their voiding technique accordingly to achieve maximum effect. A randomized, comparative study of biofeedback vs verbal feedback for learning PFM exercises after radical prostatectomy showed no difference in measures of UI at six-month follow-up (27).

Bladder training (a systematic approach to modifying voiding patterns) and prompted voiding (timely reminders to void for people with or without dementia) have also been the subject of Cochrane reviews. Most studies that met review criteria were in women, and no conclusions have been drawn about the benefit of these approaches for men (28, 29).

Results of combinations of strategies in men following prostatectomy are contradictory. Moore et al. (30) studied PFM exercises alone and in combination with electrical stimulation vs no treatment following prostatectomy and found no difference in UI among groups. Van Kampen et al. (31) compared combinations of PFM exercises with initial electrical stimulation and biofeedback vs sham electrical stimulation post-prostatectomy. Patients with urge incontinence also received bladder training. The active treatment group fared better in terms of duration and degree of continence and quality of life. Data for urge incontinence patients were not analyzed separately. In a randomized controlled trial by Vahtera et al. (32) of electrical stimulation followed by biofeedback and PFM exercises vs no treatment in 30 men and 50 women with detrusor hyperreflexia associated with multiple sclerosis, there was a

significant improvement in subjective symptoms in the male group only.

Pharmacological

The use of medications for the treatment of stress incontinence in males is anecdotal. Anticholinergic drugs (e.g., oxybutynin and tolterodine) are more effective than placebo in treating overactive bladder syndrome, which may include urgency incontinence. Systematic literature reviews concerning pharmacological treatment of urge incontinence (20) and overactive bladder syndrome with anticholinergic drugs (33, 34) reveal significant symptom improvement. Although these studies involved male subjects, the men were not analyzed separately.

Surgical

Inpatient surgical procedures for male Medicare patients diagnosed with UI decreased from 1,804 per 100,000 men with UI in 1992 to 1,751 per 100,000 in 1995 and then to 1,337 per 100,000 men with UI in 1998. The counts of procedures performed in ambulatory surgical centers more than quadrupled during this same period (Table 15); however, this trend should be interpreted with caution, given the small numbers.

According to data from the Center for Health Care Policy and Evaluation, the rate of surgical correction of UI (including revision or repair of an artificial sphincter) was 4.8 per 100,000 males having commercial health insurance in 2000 (Table 16). Rates for prior years did not reveal counts high enough to make reliable estimates about trends in this population, nor do the data reveal the specific types of surgery done.

Urgency Incontinence/Neurogenic Bladder

Augmentation cystoplasty is performed primarily for neurogenic bladder. Although many subjects in studies of this treatment are male, results are rarely reported by gender (35). There are no randomized controlled trials of augmentation cystoplasty in the literature. Electrostimulation (sacral nerve stimulation, neuromodulation) in men sends sensory input through the pudendal nerve to inhibit detrusor activity (36). Electrodes can be placed externally (in the rectum) or can be internally implanted. A review of the literature (5) reported improvement in urge incontinence in as many as 82.5% of subjects, but men and women were not reported separately.

Prevention

Prevention is typically divided into three types of measures: primary (those that prevent onset of a

Table 15. Urinary incontinence procedures for male Medicare beneficiaries, count[a], rate[b]

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total	1,100	2,363	1,640	2,563	1,700	2,274
Operation for correction of incontinence	980	2,105	1,420	2,219	1,440	1,926
Ambulatory surgery center	140	301	280	438	420	562
Inpatient	840	1,804	1,120	1,751	1,000	1,337
Hospital outpatient	0	0.0	20	31	20	27
Physician office	0	0.0	0	0.0	0	0.0
Revision or repair of prosthetic	120	258	220	344	260	348
Ambulatory surgery center	0	0.0	40	63	40	53
Inpatient	100	215	160	250	220	294
Hospital outpatient	0	0.0	20	31	0	0.0
Physician office	20	43	0	0.0	0	0.0

[a]Unweighted counts multiplied by 20 to arrive at values in the table.

[b]Rate per 100,000 Medicare beneficiaries diagnosed with urinary incontinence in the same demographic stratum.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, MedPAR and 5% Carrier File, 1992, 1995, 1998.

Table 16. Urinary incontinence procedures for males having commercial health insurance in 2000, count[a], rate[b]

	Count	Rate
Total		
Operation for correction of incontinence	48	4.8
Ambulatory surgery	12	*
Inpatient	12	*
Revision/repair of prosthetic		
Ambulatory surgery	21	*
Inpatient	3	*

*Figure does not meet standard for reliability or precision.

[a]Counts less than 30 should be interpreted with caution.

[b]Rate per 100,000 based on member months of enrollment in calendar year.

SOURCE: Center for Health Care Policy and Evaluation, 2000.

condition), secondary (those that prevent progression of the condition from its preclinical or asymptomatic state to its clinical or symptomatic state), and tertiary (those that impede the progression of a condition or its complications once it is clinically manifest). Primary prevention is most germane to UI. The principal potentially modifiable risk factors for UI in men are prostatectomy (transurethral or radical) and other medical conditions, including stroke, dementia, recurrent cystitis, bladder cancer, stool impaction, reduced mobility, diabetes, chronic cough, and medications (e.g., diuretics and hypnotics) (37).

Because as many as 30% of patients experience some degree of incontinence following radical prostatectomy (18), techniques to minimize the risk of postoperative incontinence are relevant to prevention of the disorder. Physical therapy to strengthen the pelvic floor musculature has been evaluated as primary prevention for patients undergoing prostate cancer in at least two randomized controlled trials, neither of which found a benefit (23, 24). Various surgical and perioperative techniques have also been suggested to reduce the risk of post-prostatectomy UI, including modified apical dissection and construction of a tubularized neourethra (18). Using the SEER-Medicare linked database, Begg et al. (38) described significantly lower rates of UI among men undergoing radical prostatectomy when the procedures were done in high-volume hospitals by high-volume surgeons. Of course, effective efforts to prevent prostate cancer would also decrease the incidence of male incontinence.

The goal of primary prevention for incontinence not associated with prostatectomy is to prevent the conditions believed to increase the risk of UI, including stroke, dementia, diabetes, and chronic lung disease. Modification of additional risk factors may in turn reduce the incidence of UI. Such preventive measures include controlling diabetes, preventing or treating constipation, maximizing mobility, treating symptomatic urinary tract infections, and avoiding medications that contribute to incontinence. There are apparently no studies evaluating such measures; nonetheless, it is logical to recommend them, as they are consistent with good clinical care.

ECONOMIC IMPACT

As baby boomers age, the number of individuals with incontinence rises and the heavy economic burden of UI on society grows. Governments and health care institutions are increasingly concerned about the burden of this disease, particularly since UI is one of the leading causes of individuals losing the ability to live independently and having to enter a care facility.

Direct costs of UI are borne by both the health sector and individual patients and their families. Direct costs related to operating costs for the health sector include those of both inpatient and outpatient services, particularly in the areas of supplies, equipment, and health professionals. Some direct health sector costs, such as the cost of supplies and health professionals' time, are *variable*, while others, such as the overhead incurred in running a hospital or clinic, are *fixed*. The vast majority of patients do not seek medical care; it has been estimated that only 2% of individuals living in the community and 5% of those living in institutions sought treatment for UI each year (2). Direct costs borne by the patient include the costs of medication and supplies to protect against incontinence. Padding and incontinence protection devices for men are somewhat different from those for women. Some men use gender-specific protective undergarments, which are often more costly than female garments, and some choose to use condom

drainage or an external device such as a penile clamp.

Indirect costs include lost earnings for both the patient and family or friends who provide care. Since the prevalence of UI increases dramatically with age, the working status of the 60+ age group is of particular importance.

Estimating the economic burden of UI is complicated by two factors. First, UI is often not coded as the primary diagnosis, making it difficult to quantify the incremental costs of a hospitalization or ambulatory visit attributable to UI. For example, complications of UI such as skin irritation, urinary tract infections, nursing home placements, and fractures incurred when rushing to the toilet may easily be overlooked in claims-based analyses. Second, relatively few individuals with incontinence receive medical treatment for the condition. As a result, even the most rigorous attempts to quantify the economic costs of UI underestimate the true burden. In this section, we estimate the costs of UI, using claims-based data, supplemented by findings from published studies, recent national surveys, and employer data. Because UI is uncommon in men, costs will be proportionately low compared to UI in women.

Published estimates of national annual expenditures for UI vary widely. One study found that the costs of UI-related conditions for persons age 15 and older exceeded $16.3 billion in 1995 dollars (39). Another study considered only adults 65 and over and reported that UI treatment cost $26.3 billion (2). Both studies included estimates of costs for UI-related medical complications, nursing home stays, and supplies such as pads and laundry, as well as the indirect costs of UI. Although the reasons for this wide discrepancy are not entirely clear, both estimates indicate a substantial economic burden on the American public. The data presented in this chapter address individual components of UI-related costs; hence, they may not be directly comparable to aggregate estimates drawn from the literature.

Direct Costs

A small, but notable, proportion of Medicare expenditures for male UI is accounted for by males under age 65, that is, disabled individuals (Table 17). This is consistent with clinical experience among younger men with spinal cord injury and other neurological disorders that can affect the urinary tract. Among male Medicare beneficiaries age 65 and over, total costs doubled between 1992 and 1995, from $19.1 million to $38.1 million, then remained stable in 1998 (Table 18). Most of the increase occurred in the ambulatory surgery setting, although expenditures for physician office visits also rose substantially. While the amount spent in the inpatient setting rose in absolute terms, it declined from 44% to 29%, consistent with secular trends toward outpatient care in the 1990s (Figure 3).

Table 17. Expenditures for male Medicare beneficiaries for the treatment of urinary incontinence (in millions of $), by site of service, 1998

	Total Annual Expenditures	
Site of Service	**Age < 65**	**Age 65+**
Inpatient	*	11.3
Outpatient		
Physician office	1.7	15.2
Hospital outpatient	0.3	1.3
Ambulatory surgery	1.3	10.6
Emergency room	0.1	0.6
Total	3.4	39.0

*Figure does not meet standard for reliability or precision.

SOURCE: Centers for Medicare and Medicaid Services, 1998.

Given the inherent limitations in deriving treatment costs from claims data, the Urologic Diseases in America analyses used multivariate regression models to estimate the incremental costs associated with a primary diagnosis of UI (Table 19). The study sample consisted of nearly 280,000 primary beneficiaries age 18 to 64 who had employer-provided coverage throughout 1999. Regression models were estimated for annual medical and pharmacy costs per person. The main independent variables included a set of measures to describe medical and drug benefits (such as deductibles, co-insurance, and co-payments), patient demographics (age, gender, work status), area characteristics (urban residence, median household income in zip code), and a set of comorbidities derived from the medical claims (binary indicators of 26 disease conditions such as diabetes, asthma, and hypertension). The regression results were used to predict average medical and pharmacy costs for persons with and without a primary diagnosis of

Table 18. Expenditures for male Medicare beneficiaries age 65 and over for treatment of urinary incontinence (in millions of $), (% of total)

	Year		
	1992	1995	1998
Total	19.1	38.1	39.0
Inpatient	8.4 (43.9%)	10.3 (27.0%)	11.3 (29.0%)
Outpatient			
Physician office	6.2 (32.5%)	11.0 (28.9%)	15.2 (39.0%)
Hospital outpatient	0.6 (3.1%)	2.0 (5.2%)	1.3 (3.3%)
Ambulatory surgery	3.3 (17.3%)	13.9 (36.5%)	10.6 (27.2%)
Emergency room	0.6 (3.1%)	0.9 (2.4%)	0.6 (1.5%)

NOTE: Percentages may not add to 100% because of rounding.
SOURCE: Centers for Medicaid and Medicare Services, 1992, 1995, 1998.

UI. Total annual expenditures in 1999 for privately insured adults age 18 to 64 with a primary diagnosis of UI were $7,702, nearly $4,500 more than those for similar individuals without a diagnosis of UI. Nonetheless, the aggregate cost is low, given the relative infrequency of urinary incontinence claims in men.

Although data on pharmaceutical costs are not available by gender, Table 20 presents the relative expenditures for the medications most often used to treat patients with UI. Almost half of the expenditures in 1996–1998 were for alpha-blockers, generally prescribed to older men with bladder outlet obstruction; this suggests that prostate enlargement contributes to both the human and the financial cost of UI. Not surprisingly, most of the actual prescriptions for UI were written for anticholinergic agents. Because these were predominantly generics, they

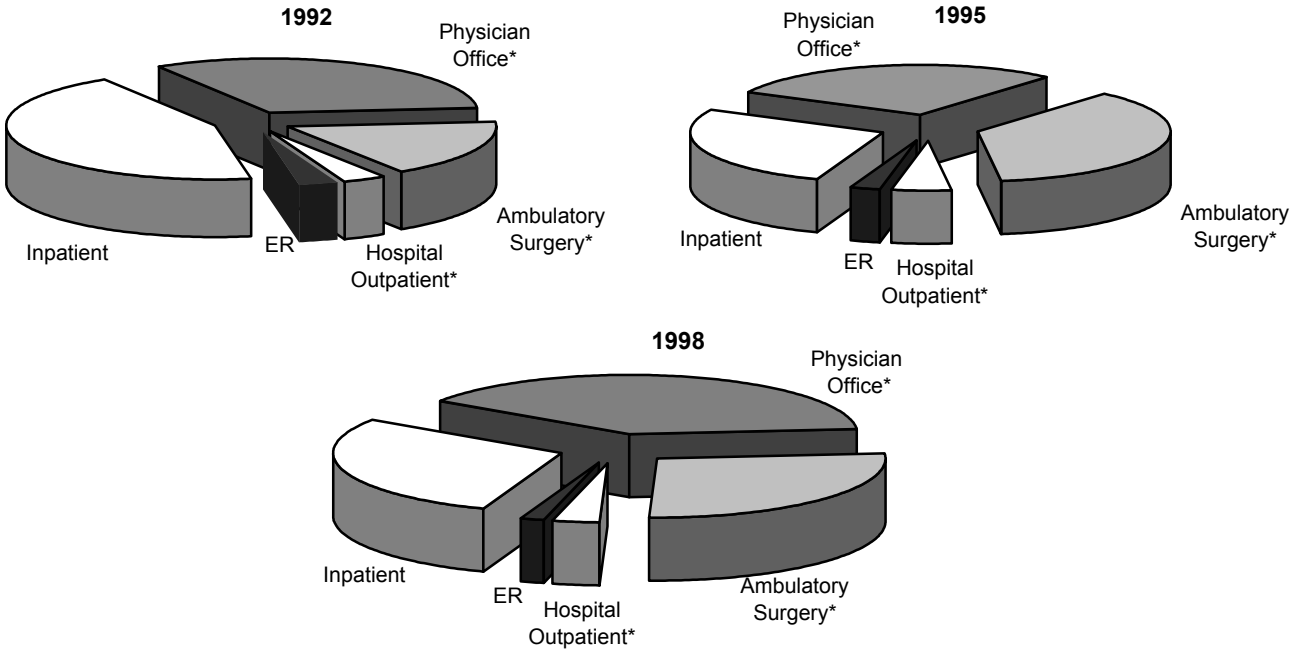

Figure 3. Expenditures of male Medicare beneficiaries age 65 and over for treatment of urinary incontinence (in millions of $).

SOURCE: Centers for Medicaid and Medicare Serivces, 1992, 1995, 1998.

Table 19. Estimated annual expenditures of privately insured workers with and without a medical claim for urinary incontinence (UI) in 1999[a] (in $)

	Annual Expenditures (per person)			
	Persons without UI (N=277,803)	Persons with UI (N=1,147)		
	Total	Total	Medical	Rx Drugs
All	3,204	7,702	6,099	1,604
Age				
18–44	2,836	7,361	5,993	1,369
45–54	3,305	8,442	6,695	1,747
55–64	3,288	7,247	5,623	1,623
Gender				
Male	2,813	*	*	*
Female	3,933	*	*	*
Region				
Midwest	3,086	8,500	6,861	1,639
Northeast	3,085	7,236	5,502	1,734
South	3,416	8,329	6,851	1,477
West	3,237	8,082	7,118	964

Rx, prescription.

*Figure does not meet standard for reliability or precision.

[a]The sample consists of primary beneficiaries ages 18 to 64 having employer-provided insurance who were continuously enrolled in 1999. Estimated annual expenditures were derived from multivariate models that control for age, gender, work status (active/retired), median household income (based on zip code), urban/rural residence, medical and drug plan characteristics (managed care, deductible, co-insurance/co-payments), and 26 disease conditions.

SOURCE: Ingenix, 1999.

Table 20. Average annual spending and use of outpatient prescription drugs for treatment of urinary incontinence (both male and female), 1996–1998[a]

Drug Name	Number of Rx Claims	Mean Price ($)	Total Expenditures ($)
Alpha-blocker			
Cardura®	378,895	43.71	16,561,486
Anticholinergics			
Oxybutynin	485,044	19.79	9,599,027
Imipramine (brand)	247,249	13.13	3,246,379
Imipramine (generic)	162,184	6.59	1,068,790
Ditropan®	130,390	32.91	4,291,146
TOTAL	1,403,762		34,766,829

Rx, prescription.

[a]Estimates include prescription drug claims with a corresponding diagnosis of urinary incontinence and exclude drugs with fewer than 30 claims. Including expenditures on prescription drugs with fewer than 30 claims (unweighted) would increase total drug spending by approximately 83%, to $63.7 million.

SOURCE: Medical Expenditure Panel Survey, 1996–1998.

represent a disproportionately small fraction of total drug expenditures in this period. Since 1998, new long-acting agents in this class have been developed and marketed, altering the economic landscape for the pharmaceutical management of individuals with UI.

Additional direct patient costs include those of pads, diapers, condom catheters, indwelling catheters, and penile clamps. Little detailed information on these costs is available; however, they are thought to be substantial, owing in large part to out-of-pocket outlays that aggregate over many years. Wagner and Hu estimated the annual cost of UI-related supplies to be $7.1 billion for individuals in the home setting and $4.3 billion for those in the institutional setting; supplies related to catheterization accounted for $224 million of the total expenditures (2).

Indirect Costs

The indirect financial burden of incontinence also falls on "informal caregivers," i.e., family and friends. Data from the 1993 Asset and Health Dynamics Study of persons over the age of 70 indicate that continent men received 7.4 hours of care per week, increasing to 11.3 hours and 16.6 hours for men with incontinence who did not and did use pads for protection, respectively. The cost of this care was an additional $1,700 per man without pads and $4,000 per man with pads (40)

Relatively little work loss is associated with UI among men, as indicated in 1999 data from Marketscan (Table 21). In fact, of the 51 men in this dataset with claims for UI, only 8% missed work because of it, about three times lower than the rate for women. Because these 51 men represent only 0.4% of the men in the sample, the proportion of men missing work for claims related to UI is only 0.03%. Among those men who missed work, the average annual work absence was only 2.3 hours, all for outpatient services, less than one-tenth the number for women. Men had much less time away from work for each outpatient visit than did women (Table 22).

RECOMMENDATIONS

The newly recommended changes in the definition of UI and its subtypes will conform better to the new ICD-10 classification, which should improve the accuracy of coding for UI. Studies are needed

Table 21. Average annual work loss of persons treated for urinary incontinence (95% CI)

			Average Work Absence (hrs)		
Gender	Number of Workers[a]	% Missing Work	Inpatient	Outpatient	Total
Male	51	8%	0.0	2.3 (0.0–5.0)	2.3 (0.0–5.0)
Female	319	23%	7.1 (1.7–12.6)	21.6 (11.3–31.9)	28.7 (14.9–42.5)

[a]Individuals with an inpatient or outpatient claim for urinary incontinence and for whom absence data were collected. Work loss is based on reported absences contiguous to the admission and discharge dates of each hospitalization or the date of the outpatient visit.

SOURCE: MarketScan, 1999.

Table 22. Average work loss associated with a hospitalization or an ambulatory care visit for treatment of urinary incontinence (95% CI)

	Inpatient Care		Outpatient Care	
Gender	Number of Hospitalizations[a]	Average Work Absence (hrs)	Number of Outpatient Visits	Average Work Absence (hrs)
Male	*	*	82	1.4 (0.1–2.7)
Female	*	*	625	11.0 (7.5–14.6)

*Figure does not meet standard for reliability or precision.

[a]Unit of observation is an episode of treatment. Work loss is based on reported absences contiguous to the admission and discharge dates of each hospitalization or the date of the outpatient visit.

SOURCE: MarketScan, 1999.

on the outcome of UI treatment specifically for men and on the role of ethnicity in both prevalence and the likelihood of seeking treatment. Given the aging population, the impact of UI within nursing home settings calls for further research into prevention, treatment, and management practices that could lessen the impact of UI on both the patients and the health care system.

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CHAPTER 5

Urinary Incontinence in Children

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Contents

Urinary Incontinence in Children

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SUMMARY

Most of the health care for pediatric urinary incontinence is delivered in the outpatient setting. During the 1990s, approximately 417,000 visits were made per year to physicians' offices and hospital outpatient departments by children with urinary incontinence listed as any diagnosis. Although the majority of these outpatient visits cannot be classified by underlying disease process, nocturnal enuresis is a listed diagnosis in up to 38% of them.

Of the commercially insured children seen for incontinence in the outpatient setting, 75% were 3- to 10-year-olds, and 15% to 20% were 11- to 17-year-olds. Only 2% to 3% of the outpatient visits were made by children under the age of 3, in whom urinary incontinence seldom has a pathologic basis.

Urinary incontinence is a relatively common reason for children to seek medical care, but it rarely requires hospitalization. When it does require inpatient care, the average length of stay is between 5 and 7 days, and the length of stay appears to be even greater in facilities providing tertiary care. Fewer than 10 of every 100,000 visits for incontinence in children are ambulatory surgical visits.

The economic burden of pediatric urinary incontinence is difficult to quantify. Data are not currently available on aggregate direct costs for inpatient, outpatient, or surgical venues. Costs for inpatient care for pediatric urinary incontinence, like those for other conditions, reflect hospital length of stay. The cost per visit for outpatient surgical procedures has increased steadily during the past decade.

DEFINITION

In contrast to the adult population, in which the inability to maintain voiding control is virtually always considered pathological, a child with urinary incontinence must be evaluated within the context of his or her developmental age. The impact on social functioning evolves as the child progresses through the first several years of life and is heavily influenced by social, cultural, and environmental factors.

Development of Voiding Control

In the infant, normal micturition occurs via a spinal-cord-mediated reflex. As the bladder fills, it surpasses an intrinsic volume threshold, which results in a spontaneous bladder contraction. This vesico-vesical reflex coordinates relaxation of the bladder neck and external urethral sphincter. Voiding is complete, occurs at low pressure, and is autonomous. In the infant, the volume threshold for urination is low; the infant voids approximately 20 times per day (1).

As the infant develops and neural pathways in the spinal cord mature, the vesico-vesical reflex is suppressed. A more complex voiding reflex, mediated at the level of the pons and midbrain, assumes coordination of voiding control. During this transitional period, functional bladder capacity increases, and the frequency of urination decreases. By 2 years of age, most children void 10 to 12 times per day, are aware of bladder fullness, and can announce their need to urinate (1). Between 2 and 3 years of age, children attain the ability to volitionally postpone voiding and to initiate voiding at bladder

volumes less than capacity. During this period, an adult pattern of daytime urinary control emerges, characterized by a stable, quiescent bladder.

As with other developmental milestones, the time course for attaining urinary continence demonstrates individual variability. The majority of children master toileting prior to entrance into school, (i.e., by around 5 years of age). Beyond this age, incontinence becomes an increasing social concern. Brazelton and colleagues studied the development of voiding control and found that 26% of children had attained daytime continence by the age of 24 months, 52.5% by 27 months, 85% by 30 months, and 98% by 3 years of age (2). Bloom and colleagues studied 1,186 normal children and found that the age at which toilet training was achieved ranged from 9 months to 5.25 years, with a mean of 2.4 years. Toilet training occurred slightly earlier in females (3).

Defining pediatric urinary incontinence has historically been complicated by the lack of standardized definitions for pediatric voiding disorders. In 1997, the International Children's Continence Society attempted to ameliorate this problem by generating a report on standardization and definitions for lower urinary tract dysfunction in children (4). In the consensus report, urinary incontinence is defined as *the involuntary loss of urine, objectively demonstrable, and constituting a social or hygienic problem.*

Urethral incontinence occurs via a native or reconstructed urethra and is stratified as follows:

- stress incontinence, the involuntary loss of urine occurring in absence of detrusor contraction, when intravesical pressure exceeds urethral pressure;
- reflex incontinence, the loss of urine due to detrusor hyperreflexia and/or involuntary urethral relaxation in the absence of the sensation to void;
- overflow incontinence, any involuntary loss of urine associated with overdistension of the bladder;
- urge incontinence, involuntary loss of urine associated with a strong desire to void.

Extraurethral incontinence is defined as urine loss via a conduit other than the urethra, such as ectopic ureters (in girls) and vesicostomies.

Enuresis denotes a physiologically coordinated void occurring at an inappropriate or socially unacceptable time or place. The most recent version of the Diagnostic and Statistical Manual (DSM IV-TR) defines the essential features as repeated voiding of urine into bed or clothes and two occurrences per week for at least three months, causing clinically significant distress or impairment in social, academic (occupational), or other important areas of functioning. The child must have reached an age at which continence is expected (a chronological age of 5 years, or a mental age of 5 years for a developmentally delayed child), and the condition must not be due exclusively to the direct physiological effects of a substance or general medical condition (5).

Etiologic Classification of Pediatric Urinary Incontinence

Childhood urinary incontinence can be classified as organic or functional. Organic incontinence refers to an underlying disease process, which can be either neurogenic or structural in nature. Neurogenic forms of incontinence can be congenital or acquired; they include etiologies such as neurospinal dysraphism, sacral agenesis, cerebral palsy, spinal cord injury, and tethered spinal cord. Structural incontinence refers to developmental, iatrogenic, or traumatic anatomic abnormalities of the lower urinary tract that interfere with the urinary system's ability to hold, store, or evacuate urine. Structural incontinence includes diseases such as exstrophy-epispadias complex, ectopic ureter, and posterior urethral valves.

Functional incontinence is that in which no anatomic or neurologic abnormality can be found. It comprises a heterogeneous group of disorders, including the urge syndrome, dysfunctional voiding, lazy bladder, and enuresis. The prevalence of functional incontinence in the pediatric population merits special focus.

Urge incontinence occurs predominantly in girls and is commonly associated with other medical complaints, such as constipation, recurrent urinary tract infections, and vesicoureteral reflux. It is manifested clinically by urinary frequency, the sudden imperative to void, and holding maneuvers such as squatting on the heel (the so-called Vincent's Curtsy), crossing the legs, and flexing the pelvic floor muscles. This symptom complex is the result of overactivity of

the detrusor muscle, which results in sudden bladder contractions at volumes below age-expected capacity. Incontinence occurs in those children who are unable to suppress bladder contraction volitionally.

The inability to maintain detrusor quiescence is common during the transitional phase between infantile and adult patterns of urinary control. Urge incontinence represents recurrence or persistence of this transitional phase.

Dysfunctional voiding includes several patterns of voiding with a single underlying feature: overactivity of the pelvic floor muscles during micturition. It is likely that urge incontinence and dysfunctional voiding represent different time points along the natural history of a single disease process. Children with urgency symptoms learn to abort detrusor contractions by volitional contraction of the external urethral sphincter and pelvic floor muscles. The long-term consequences of pelvic floor overactivity include high-pressure voiding, urinary infections, ureteral reflux, and, ultimately, decompensation of the detrusor muscle. Urinary incontinence can occur at any point along the continuum and results from infection, inefficient holding response, or overflow incontinence.

Enuresis is characterized by synergistic bladder-urethral function and typically occurs while the child is asleep (enuresis nocturna). This disorder is extraordinarily common in young children, with a reported incidence of 15% to 20% in 5-year-olds. It is characterized by spontaneous resolution, with 15% resolving each year after the age of 5. At age 7, the prevalence is approximately 8%. Approximately 2% of 15-year-olds continue to have wet nights (6).

A rare type of enuresis, giggle incontinence (enuresis risoria), occurs only during intense laughter. It is characterized by an abrupt, uncontrollable bladder contraction. Bladder emptying is generally complete. Affected individuals often modify their social interactions to avoid situations that are likely to induce laughter. The term diurnal enuresis (enuresis diurna) is commonly used to describe daytime wetting. A better term for this disorder is diurnal incontinence.

Vaginal voiding refers to a specific form of wetting that is characterized by post-void dribbling. It is seen predominantly in slender females who are unable to adopt an appropriate posture while voiding. This leads to trapping of urine in the vagina. It can also be seen in overweight females who are unable to adequately separate their labia during urination. The treatment of vaginal voiding involves modification of voiding posture to prevent pooling of urine in the vagina.

DIAGNOSIS

Evaluation of a child with incontinence typically begins in an office-based setting. A thorough medical history will delineate the pattern of incontinence and may identify underlying neurologic or structural anomalies. Parents are carefully questioned about the child's voiding habits, including straining, urinary frequency, posturing, pain with urination, and infection. A meticulous obstetrical history will reveal evidence of fetal distress, anoxia, birth trauma, hydronephrosis, or oligohydramnios. Developmental delays or impaired upper- or lower-extremity motor skills warrant careful attention. The association of encopresis and wetting in the older child raises the suspicion of occult neuropathy.

The physical examination should include inspection of the abdomen, genitalia, and back, as well as a directed neurologic examination. The lower back is inspected for scoliosis and stigmata of occult spinal dysraphism, such as a sacral dimple, hair patch, hemangioma, or lipoma. The coccyx is examined for evidence of sacral agenesis. The genital exam may disclose labial adhesions or an abnormal urethral position in females, or urethral abnormalities in males.

Most patients brought for evaluation before the age of 5 require no more than a history and physical examination. Additional diagnostic studies in patients younger than 5 are generally reserved for those who have evidence of a structural or neurologic abnormality or associated urinary tract symptoms such as infection or hematuria.

Noninvasive diagnostic studies used to evaluate incontinence include urinalysis, spinal tomography, urine-flow measurement, electromyography, and renal/bladder ultrasonography. Invasive studies, such as voiding cystography, and multichannel urodynamic evaluation are reserved for selected clinical situations. These procedures are generally performed in an outpatient setting.

Patients with functional incontinence are treated on an ambulatory basis with observational, medical, or behavioral therapy. Only rarely does a patient with functional incontinence require surgical intervention, and then only after all nonsurgical interventions have been exhausted. Inpatient treatment is largely reserved for those with neurologic or structural abnormalities who require surgical therapy.

ANALYTIC PERSPECTIVE

Pediatric urinary incontinence is commonly seen in both urologic and general pediatric practice. The contemporary literature is replete with patient-based and specialty department-based investigations of voiding disorders in children. Unfortunately, there is a paucity of population-based investigations of these conditions. Data collected from existing health care utilization databases do, however, provide insight into the trends in utilization of services for pediatric incontinence. An important caveat is that undercoding or miscoding may lead to undercounting of many conditions which fall under the umbrella of pediatric incontinence.

Most of the data in this chapter come from five databases. The data include observations derived from both public and proprietary sources and represent patient encounters in many health care settings. Both commercially insured and government-insured pediatric populations are included. In all cases, pediatric incontinence has been identified for analysis using the relevant 5-digit ICD-9 codes. Patients meeting criteria for inclusion are stratified where possible by age, gender, geographic region, and race/ethnicity. The disease codes used to define urinary incontinence in each of these databases are listed in Table 1.

The pediatric group is defined as patients 0 to 17 years of age. The youngest age group consists of patients less than 3 years of age and represents a cohort in which the majority are physiologically and developmentally incapable of voiding control. Children between the ages of 3 and 11 constitute the cohort in which incontinence encounters are most common. Adolescents and young adults aged 11 to

Table 1. Codes used in the diagnosis and management of pediatric urinary incontinence

Individuals under 18 with one of the following ICD-9 diagnosis codes, but not a coexisting 952.xx or 953.xx code:	
307.6	Enuresis
596.59	Other functional disorder of bladder
596.52	Low bladder compliance
596.51	Hypertonicity of bladder (overactive bladder specified in 2001)
596.8	Other specified disorders of bladder
596.9	Unspecified disorder of bladder
599.8	Other specified disorders of urethra and urinary tract
599.81	Urethral hypermobility
599.82	Intrinsic urethral sphincter deficiency (ISD)
599.83	Urethral instability
599.84	Other specified disorders of urethra
625.6	Stress incontinence, female
788.3	Urinary incontinence
788.31	Urge incontinence
788.3	Urinary incontinence, unspecified
788.32	Stress incontinence, male
788.33	Mixed incontinence, male, female
788.34	Incontinence without sensory awareness
788.36	Nocturnal enuresis
788.37	Continuous leakage
788.39	Other urinary incontinence

17 are included in a separate cohort. More detailed age stratification is impossible because of limited sample sizes in the datasets. These age strata present methodological limitations in analyzing nocturnal enuresis, about which awareness increases at about age 7 when children start school and are exposed to a broader social environment. Eighteen-year-olds are included in the adult analyses.

Results are reported within three venues of health care delivery—inpatient, outpatient, and ambulatory surgery—followed by an economic perspective. In general, datasets are analyzed by both primary and any listed diagnoses of incontinence. Trend analyses are available for databases with serial years of data.

Given the heterogeneity of the incontinence population and the limitations of ICD-9 coding, it is impossible to stratify subjects etiologically. Samples in which raw counts are less than 30 have been suppressed and are not presented in this chapter. The analyses reported here are limited by the absence of national data on the use of prescription medications for children with incontinence.

TRENDS IN HEALTH CARE RESOURCE UTILIZATION

Inpatient Care

Urinary incontinence is a common reason for care-seeking by the pediatric population, but it requires hospitalization far less frequently than is the case for adults. The rate of annual admissions nationwide for a primary diagnosis of incontinence is less than 1 per 100,000 children (Table 2). There is no indication that these numbers changed substantially between 1994 and 2000. However, over the same time period, the average length of hospital stay increased from 4.7 to 5.6 days. Hospital stays were slightly longer, on average, for patients admitted to urban hospitals than for the total group studied (Table 3).

Table 2. National inpatient hospital stays by children with urinary incontinence listed as primary diagnosis, count, rate[a] (95% CI)

	Count	Rate
1994	283	0.4 (0.2–0.6)
1996	208	0.3 (0.1–0.4)
1998	195	0.3 (0.1–0.4)
2000	201	0.3 (0.1–0.4)

[a]Rate per 100,000 based on 1994, 1996, 1998, 2000 population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation, for relevant demographic categories of US civilian non-institutionalized population under 18 years of age.

SOURCE: Healthcare Cost and Utilization Project Nationwide Inpatient Sample, 1994, 1996, 1998, 2000.

Table 3. Trends in mean inpatient length of stay (days) for children hospitalized with urinary incontinence listed as primary diagnosis

	Length of Stay
1994	4.7
1996	5.1
1998	5.3
2000	5.6

MSA, metropolitan statistical area.

*Figure does not meet standard for reliability or precision.

SOURCE: Healthcare Cost and Utilization Project Nationwide Inpatient Sample, 1994, 1996, 1998, 2000.

The National Association of Children's Hospitals and Related Institutions (NACHRI) database provides information on several aspects of inpatient care in the nation's pediatric hospitals, including data on length of hospital stay for calendar years 1999 to 2001 (Table 4). A cohort of 1,251 patients with urinary incontinence listed as the principal diagnosis was identified. The average length of hospitalization for these patients was 6.9 days. The duration was greater for older children, averaging 7.8 days in the 11- to 17-year-old cohort, compared with 4.5 days for patients under 3 years of age. Duration of hospitalization did not vary by gender, race/ethnicity, or geographic region. Unlike the length of stay reported in the Health Cost and Utilization Project (HCUP) data, length of stay in the NACHRI data was stable over the time frame studied (Tables 3 and 5). Because NACHRI collects data primarily from tertiary-care pediatric specialty hospitals, its findings are likely weighted toward patients receiving higher intensity care than is represented in the population-based HCUP.

Outpatient Care

Most of the evaluation and management of incontinence in children is performed in physicians' offices. The National Hospital Ambulatory Medical Care Survey (NHAMCS) provides data on a

Table 4. Mean inpatient length of stay (days) for children hospitalized with urinary incontinence listed as primary diagnosis, 1999–2001 (95% CI)

	Count	Length of Stay	
All	1,251	6.9	(6.5–7.3)
Age			
0–2	83	4.5	(3.1–5.9)
3–10	672	6.5	(6.1–7.0)
11– 17	496	7.8	(7.0–8.5)
Race/ethnicity			
White	873	6.7	(6.3–7.2)
Black	116	7.2	(6.1–8.3)
Asian	11	7.1	(4.7–9.5)
Hispanic	150	6.7	(5.8–7.7)
American Indian	2	5.0	(0–18)
Other	42	9.4	(5.8–13)
Missing	57	7.4	(5.5–9.4)
Gender			
Male	593	6.7	(6.3–7.2)
Female	658	7.0	(6.4–7.6)
Region			
Midwest	451	7.4	(6.8–8.0)
Northeast	79	6.5	(2.7–10)
South	512	6.8	(6.4–7.2)
West	197	6.3	(5.5–7.2)
Missing	12	5.2	(2.8–7.7)

SOURCE: National Association of Children's Hospitals and Related Institutions, 1999–2001.

nationally representative sample of visits to hospital outpatient departments. NHAMCS data for patients with urinary incontinence are shown in Table 6. During four years of data collection (1994, 1996, 1998, and 2000), 243,210 hospital outpatient visits were made by children with urinary incontinence listed as any diagnosis. This represents a rate of 343 visits per 100,000 children. There were 127,586 visits for a primary diagnosis of urinary incontinence, a rate of 180 visits per 100,000 children. According to data from Schmitt (7), about 10% of children 6 years of age wet the bed. Taken together, these data suggest that urinary incontinence is a relatively common diagnosis in the pediatric population.

Analogous data from the National Ambulatory Medical Care Survey (NAMCS) are detailed in Table 7. In contrast to NHAMCS, these data are collected by physicians in office-based settings. During 1992, 1994, 1996, 1998, and 2000, there were 1,781,506 visits for which urinary incontinence was coded as any diagnosis, a rate of 2,548 per 100,000 children. A total of 1,126,911 office visits were made by children with a primary diagnosis of incontinence, a rate of 1,612 per 100,000 children.

Trends in health care utilization for urinary incontinence are available from the Center for Health Care Policy and Evaluation (CHCPE). This dataset contains national data from both traditional, commercially managed health plans and managed Medicaid programs. Data were evaluated for even years between 1994 and 2000. Base populations for the rates presented are children with the same demographic characteristics. Among members of commercial health plans, physician outpatient visits for a primary diagnosis of urinary incontinence ranged from 495 per 100,000 to 533 per 100,000; there was no trend toward an increasing rate over time (Table 8). Rates for visits in which incontinence was listed as any diagnosis ranged from 658 per 100,000 in 1994 to 782 per 100,000 in 2000, with an increasing trend over the years studied (Table 8). In each year studied, visits by boys were more common than visits by girls, the ratio being approximately 1.3:1. More than 75% of the visits were made by 3- to 10-year-olds. Interestingly, more than 2% of physician encounters occurred with patients under the age of 3 (Figure 1).

The findings were similar among enrollees in managed Medicaid plans. During the same time frame, 1994 to 2000, outpatient visits for a primary diagnosis of incontinence ranged from 497 per 100,000 to 682 per 100,000 (Table 9). Visit rates for which incontinence was listed as any diagnosis ranged from 739 per 100,000 to 1,083 per 100,000 (Table 9). Boys and girls were seen in similar proportions.

A detailed assessment of disease states contributing to incontinence is beyond the scope of the databases analyzed, in terms of both sample size constraints and the inherent lack of precision in ICD-9 coding. Nevertheless, the CHCPE data allowed us to parse the relative proportion of visits for selected diagnoses of incontinence (Table 10). The most common single condition in outpatients with a diagnosis of incontinence was nocturnal enuresis. The rate of physician outpatient visits for this condition

Table 5. Trends in mean inpatient length of stay (days) for children hospitalized with urinary incontinence listed as primary diagnosis (95% CI)

	1999		2000		2001	
	Count	Length of Stay	Count	Length of Stay	Count	Length of Stay
All[a]	371	6.8 (6.2–7.3)	413	7.3 (6.4–8.1)	467	6.6 (6.1–7.2)
Age						
0–2	30	5.2 (2.0–8.3)	26	3.0 (1.6–4.4)	27	5.3 (2.8–7.7)
3–10	198	6.6 (5.9–7.4)	218	6.7 (6.1–7.2)	256	6.4 (5.6–7.2)
11–17	143	7.3 (6.5–8.1)	169	8.7 (6.7–11)	184	7.3 (6.5–8.0)
Race/ethnicity						
White	265	6.6 (6.0–7.2)	291	7.3 (6.1–8.4)	317	6.4 (5.8–6.9)
Black	33	6.8 (5.3–8.2)	37	7.9 (4.9–11)	46	7.0 (5.8–8.1)
Asian	4	5.5 (2.7–8.3)	2	6.5 (0–51)	5	8.6 (3.4–14)
Hispanic	42	6.5 (4.6–8.4)	41	7.0 (5.1–8.9)	67	6.7 (5.4–8.1)
American Indian	1	4.0	0		1	6.0
Other	9	7.2 (3.9–10)	17	8.2 (5.5–11)	16	11.8 (2.5–21)
Missing	17	10.4 (4.2–16)	25	6.4 (4.7–8.1)	15	5.9 (3.9–7.8)
Gender						
Male	204	6.8 (6.0–7.6)	188	7.1 (6.3–7.9)	201	6.3 (5.7–6.9)
Female	167	6.7 (5.9–7.5)	225	7.4 (6.0–8.8)	266	6.9 (6.0–7.7)
Region						
Midwest	138	8.0 (6.9–9.0)	147	7.2 (6.4–8.1)	166	7.0 (5.8–8.1)
Northeast	23	4.4 (2.1–6.7)	28	9.8 (0–20)	28	5.0 (3.6–6.4)
South	139	6.6 (5.9–7.4)	176	7.0 (6.2–7.8)	197	6.7 (6.1–7.4)
West	63	5.3 (4.2–6.4)	58	7.2 (5.4–9.0)	76	6.4 (5.0–7.9)
Missing	8	5.6 (1.9–9.4)	4	4.5 (0.5–8.5)	0	

SOURCE: National Association of Children's Hospitals and Related Institutions, 1999–2001.

Table 6. National hospital outpatient visits by children with urinary incontinence, count (95% CI), number of visits, percentage of visits, rate (95% CI)

Total	4-Year Count (95% CI)	Total No. Visits by Males/ Females < 18, 1994–2000	% of Visits	4-Year Rate[a] (95% CI)
Primary diagnosis	127,586 (77,011–178,161)	72,578,652	0.2	180 (109–252)
Any diagnosis	243,210 (173,678–312,742)	72,578,652	0.3	343 (245–442)

[a]Rate per 100
years.
categories of US civilian non-institutionalized population under age 18.

SOURCE: National Hospital Ambulatory Medical Care Survey, 1994, 1996, 1998, 2000.

Table 7. National physician office visits by children with urinary incontinence, count (95% CI), number of visits, percentage of visits (%), rate[a] (95% CI)

Total	5-Year Count (95% CI)	Total No. Visits by Males/ Females <18, 1992–2000	% of Visits	5-Year Rate (95% CI)
Primary diagnosis	1,126,911 (683,252–1,570,570)	809,286,031	0.1	1,612 (977–2,247)
Any diagnosis	1,781,506 (1,247,877–2,315,135)	809,286,031	0.2	2,548 (1,785–3,312)

[a]Rate per 100,
five years. Population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation for relevant demographic categories of US civilian non-institutionalized population under age 18.
SOURCE: National Ambulatory Medical Care Survey, 1992, 1994, 1996, 1998, 2000.

was similar between commercially insured and managed Medicaid populations, ranging from 102 per 100,000 in 1994 to 283 per 100,000 in 2000. A trend toward increased utilization was seen in both groups between 1994 and 2000. The increased utilization of physician outpatient services by children with nocturnal enuresis may be due in part to increased public awareness of the disorder.

Ambulatory Surgery

Because most children with urinary incontinence receive medical or behavioral treatment, their utilization of ambulatory surgical services should be low. In general, those who undergo surgical therapy require inpatient care. CHCPE data support this generalization. Fewer than 9 per 100,000 commercially insured children presenting for ambulatory surgical treatment in 1998 and 2000 had incontinence listed as any diagnosis. As expected, rates were highest among 3- to 10-year-olds (Table 11). Small counts in this dataset preclude reliable estimation of these rates for 1994 and 1996. Stratification by race/ethnicity, gender, and geographic region is also impossible with this dataset.

ECONOMIC IMPACT

Little information is available about the economic burden of pediatric urinary incontinence in the United States. Urinary incontinence encompasses a heterogeneous family of disorders with clinical strategies dictated by the underlying condition. Costs should primarily reflect the nature of that condition. Unfortunately, available data do not allow this type of analysis.

Hospital admissions represent a small fraction of the children seeking care for urinary incontinence. This implies that care delivered in the hospital setting should represent a small proportion of overall costs. NACHRI cost data from its participating children's hospitals indicate that between calendar years 1999 and 2001, the average cost of hospitalization for urinary incontinence was $15,219; it increased from $8,366 in those under age 3 to $14,223 in 3- to 10-year-olds, and to $17,715 in 11- to 17-year-olds (Table 12). This trend appears to reflect a longer average length of hospital stay for the older two groups (Table 4). However, the data are not risk-adjusted and therefore must be interpreted with caution. No variability by

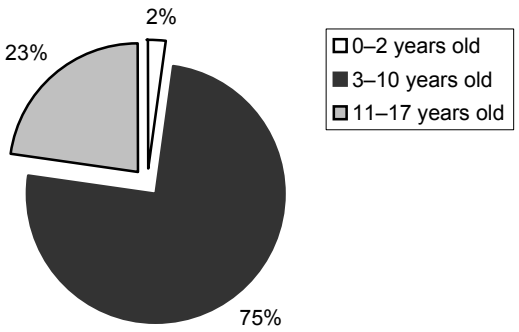

Figure 1. Age distribution of physician outpatient visits for children having commerical health insurance with urinary incontinence listed as primary diagnosis.

SOURCE: Center for Health Care Policy and Evaluation, 1994, 1996, 1998, 2000.

Table 8. Physician outpatient visits for urinary incontinence by children having commercial health insurance, count[a], rate[b]

	1994		1996		1998		2000	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate
	As Primary Diagnosis							
Total	1,589	501	2,287	504	3,308	495	3,841	533
Age								
< 3	28	*	65	111	81	91	80	84
3–10	1,166	800	1,714	822	2,501	814	2,882	884
11–17	395	302	508	273	726	266	879	294
Gender								
Male	975	599	1,331	574	1,853	541	2,094	566
Female	614	397	956	432	1,455	447	1,747	498
	As Any Diagnosis							
Total	2,089	658	3,104	685	4,655	697	5,636	782
Age								
< 3	48	118	96	164	123	139	137	144
3–10	1,549	1,063	2,371	1,137	3,565	1,161	4,271	1,310
11–17	492	376	637	342	967	355	1,228	411
Gender								
Male	1,294	795	1,784	769	2,628	767	3,114	842
Female	795	514	1,320	596	2,027	623	2,522	719

*Figure does not meet standard for reliability or precision.

[a]Counts less than 30 should be interpreted with caution.

[b]Rate per 100,000 based on member months of enrollment in calendar year for children in the same demographic stratum.

SOURCE: Center for Health Care Policy and Evaluation, 1994, 1996, 1998, 2000.

gender or race/ethnicity was noted in the costs of hospitalization.

The aggregate costs of delivering outpatient care for incontinence are not available, but CHCPE data provide trends in physician payment over the years from 1994 to 2000. During this period, the total mean payment for physician office visits by commercially insured children with a primary diagnosis of incontinence rose from $45 in 1994 to $60 in 2000, of which $10 to $13 was patient co-payments. Payments did not differ by age group (Table 13). Outpatient physician payments were much lower for children covered by managed Medicaid plans, ranging from $24 in 1994 to $38 in 2000 (Table 14). The differences in payments between commercially insured children and those in managed Medicaid plans were due only in part to the absence of patient co-payments in the latter group.

Although there are no direct measures of the medical coasts associated with pediatric UI, the total probably does not exceed $15 to $20 million. Table 7 shows that there are roughly 225,000 physician visits for pediatric UI per year. At $50 per visit, this would total $11 million. Similarly, the 200 annual hospitalizations shown in Table 2, at $15,000 per hospitalization would add only another $3 million.

RECOMMENDATIONS

Pediatric urinary incontinence encompasses a vast array of disease states—acute, chronic, congenital, and acquired. As in other patient groups, incontinence in children implies either a symptom or a sign, rather than a specific disease entity. While patterns of care-seeking behavior are often driven by symptoms, resource utilization, management strategies, and costs are generally dictated by the underlying condition. ICD-9 coding currently relegates urinary incontinence to a 4-digit code. Most of the 5-digit ICD-9 codes for incontinence are symptom-based, and while they are illustrative, they do not provide an etiologic context. Future population-based studies should attempt to characterize care-seeking for incontinence by underlying diagnosis.

Table 9. Physician outpatient visits for urinary incontinence by children having Medicaid, count[a], rate[b]

	1994		1996		1998		2000	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate
				As Primary Diagnosis				
Total	210	656	293	497	246	649	318	682
Age								
< 3	9	*	14	*	3	*	9	*
3–10	178	975	239	735	203	1,049	242	1,039
11–17	23	*	40	311	40	411	67	516
Gender								
Male	96	599	138	467	127	667	160	684
Female	114	713	155	526	119	631	158	680
				As Any Diagnosis				
Total	298	931	436	739	330	871	505	1,083
Age								
< 3	13	*	19	*	5	*	16	*
3–10	252	1,380	348	1,070	277	1,431	392	1,683
11–17	33	568	69	537	48	493	97	747
Gender								
Male	145	904	228	772	181	951	267	1,141
Female	153	957	208	706	149	791	238	1,024

*Figure does not meet standard for reliability or precision.

[a]Counts less than 30 should be interpreted with caution.

[b]Rate per 100,000 based on member months of enrollment in calendar year for children in the same demographic stratum.

SOURCE: Center for Health Care Policy and Evaluation, 1994, 1996, 1998, 2000.

Table 10. Number of plan members per year with a physician outpatient visit for pediatric urinary incontinence, by underlying condition, count[a], rate[b]

	1994		1996		1998		2000	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate
				Commercially Insured Population				
Spina bifida-associated	2	0.6	7	1.5	11	1.6	14	1.9
Spinal cord injury-associated	1	0.3	0	0	4	0.6	5	0.7
Neurogenic incontinence NOS	10	3.2	32	7.1	66	9.9	91	13
Nocturnal enuresis	322	102	642	142	1,249	187	1,660	231
Other incontinence	1,224	386	1,687	372	2,380	356	2,642	367
				Medicaid Population				
Spina bifida-associated	0	0	1	1.7	1	2.6	0	0
Spinal cord injury-associated	0	0	0	0	0	0	0	0
Neurogenic incontinence NOS	2	1.1	3	5.1	1	2.6	3	6.4
Nocturnal enuresis	38	119	59	100	61	161	132	283
Other incontinence	182	568	276	468	191	504	233	500

[a]Counts less than 30 should be interpreted with caution.

[b]Rate per 100,000 children in the same demographic stratum.

NOTE: Categories
occurred on a claim for that patient that year.

SOURCE: Center for Health Care Policy and Evaluation, 1994, 1996, 1998, 200.

Table 11. Visits to ambulatory surgery centers for urinary incontinence listed as any diagnosis by children having commercial health insurance, count[a], rate[b]

	1994		1996		1998		2000	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate
Total	20	*	23	*	57	8.5	63	8.8
Age								
< 3	0	0.0	3	*	3	*	1	*
3–10	15	*	13	*	38	12	44	14
11–17	5	*	7	*	16	*	18	*
Gender								
Male	12	*	9	*	24	*	33	8.9
Female	8	*	14	*	33	10	30	8.6

*Figure does not meet standard for reliability or precision.

[a]Counts less than 30 should be interpreted with caution.

[b]Rate per 100,000 based on member months of enrollment in calendar year for children in the same demographic stratum.

SOURCE: Center for Health Care Policy and Evaluation, 1994, 1996, 1998, 2000.

Table 12. Mean inpatient cost per child[a] (in $) admitted with urinary incontinence listed as primary diagnosis, 1999–2001 (95% CI)

	Count	Mean Cost	
Total	1,251	15,219	(14,158–16,279)
Age			
0–2	83	8,366	(6,342–10,390)
3–10	672	14,223	(13,071–15,376)
11–17	496	17,715	(15,591–19,838)
Race/ethnicity[b]			
White	873	15,190	(13,911–16,469)
Black	116	14,157	(11,095–17,220)
Asian	11	14,291	(9,243–19,340)
Hispanic	150	14,838	(12,879–16,797)
American Indian	2	106,191	(0–107,008)
Gender			
Male	593	14,788	(13,811–15,766)
Female	658	15,607	(13,791–17,422)
Region[b]			
Midwest	451	15,472	(13,797–17,147)
Northeast	79	17,285	(6,081–28,489)
South	512	15,594	(14,548–16,640)
West	197	13,763	(11,850–15,675)

[a]Calculated using adjusted ratio of costs to charges, including variable and fixed cost among participating children's hospitals.

[b]Values do not sum to total due to inclusion of children whose region or race/ethnicity is listed as other or missing.

SOURCE: National Association of Children's Hospitals and Related Institutions, 1999–2001.

Unfortunately, it is difficult to obtain reliable epidemiologic data for urinary incontinence in children. Stratification by smaller age cohorts might provide more insight into care-seeking patterns and the natural history of incontinence complaints. A specific finding that warrants further investigation is the demonstrated health care utilization by patients under age 3. In most clinical contexts, wetting in this age cohort does not require investigation. It is unclear whether this finding is spurious, reflects the imprecision of ICD-9 coding, or represents changing attitudes toward toilet training in young children. Future analyses could characterize incontinence admissions by specific underlying diagnosis, associated diagnoses, nature of procedures, or distribution of charges. It is likely that patients requiring hospitalization represent a distinct subset of the incontinence population.

Although the majority of pediatric urinary incontinence care is provided in the outpatient setting, several features of such treatment warrant further investigation. The data sources analyzed for this chapter do not allow characterization of pediatric incontinence care by the subspecialty of the treating physician. Likewise, the proportion of costs associated with pharmaceutical usage, behavioral therapy, and diagnostic studies remains obscure. In addition, the available datasets do not allow for meaningful evaluation of long-term trends or regional variation.

The economic burden of urinary incontinence invites further investigation. Direct costs of

Table 13. Payments (in $) by children having commercial health insurance for physician outpatient visits with urinary incontinence listed as primary diagnosis

	Count[a]	Mean Total Payments	Total Amount Paid by Plan	Total Amount Paid by Patient	Count[a]	Mean Total Payments	Total Amount Paid by Plan	Total Amount Paid by Patient
	1994				1996			
Total	1,547	45	35	10	2,245	50	40	10
Age								
<3	27	38	28	9.7	61	47	36	11
3–10	1,137	46	36	10	1,684	51	40	10
11–17	383	44	34	9.5	500	47	37	10.0
Gender								
Male	953	43	34	9.2	1,313	49	38	10
Female	594	49	37	12	932	52	41	10
	1998				2000			
Total	3,263	57	45	12	3,794	60	47	13
Age								
<3	79	55	42	13	78	54	42	12
3–10	2,466	57	45	12	2,851	60	47	13
11–17	718	56	45	11	865	57	45	12
Gender								
Male	1,835	54	43	11	2,070	56	44	12
Female	1,428	60	47	13	1,724	63	50	13

[a]Counts less than 30 should be interpreted with caution.

SOURCE: Center for Health Care Policy and Evaluation, 1994, 1996, 1998, 2000.

Table 14. Payments (in $) by children having Medicaid for physician outpatient visits with urinary incontinence listed as primary diagnosis

	Count[a]	Mean Total Payments	Total Amount Paid by Plan	Total Amount Paid by Patient	Count[a]	Mean Total Payments	Total Amount Paid by Plan	Total Amount Paid by Patient
	1994				1996			
Total	207	24	24	0	290	36	36	0
Age								
<3	9	28	28	0	13	30	30	0
3–10	175	24	24	0	238	37	37	0
11–17	23	28	28	0	39	31	31	0
Gender								
Male	96	24	24	0	136	33	33	0
Female	111	25	25	0	154	38	38	0
	1998				2000			
Total	238	40	40	0	271	38	38	0
Age								
<3	3	45	45	0	6	34	34	0
3–10	197	40	40	0	209	37	37	0
11–17	38	41	41	0	56	39	39	0
Gender								
Male	124	39	39	0	140	36	36	0
Female	114	41	41	0	131	39	39	0

[a]Counts less than 30 should be interpreted with caution.

SOURCE: Center for Health Care Policy and Evalutaion, 1994, 1996, 1998, 2000.

incontinence could be characterized and stratified in greater detail. The available datasets do not allow evaluation of aggregate costs by treatment venue. An evaluation of indirect costs, including work absenteeism among caretakers and school absences among those treated, is also not available.

Urinary incontinence is a common reason for health care visits by children. Despite the prevalence of these complaints in the pediatric age group, relatively little epidemiologic and health services research has been directed at the large information gaps. To estimate the burden of pediatric incontinence care with an accurate picture of contemporary care patterns, this chapter has synthesized data from a broad array of sources, but the sparsity of the data has made the task difficult.

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